UNIVERSAL

MODEL AIRPLANE NEWS

AUGUST

1933

20¢

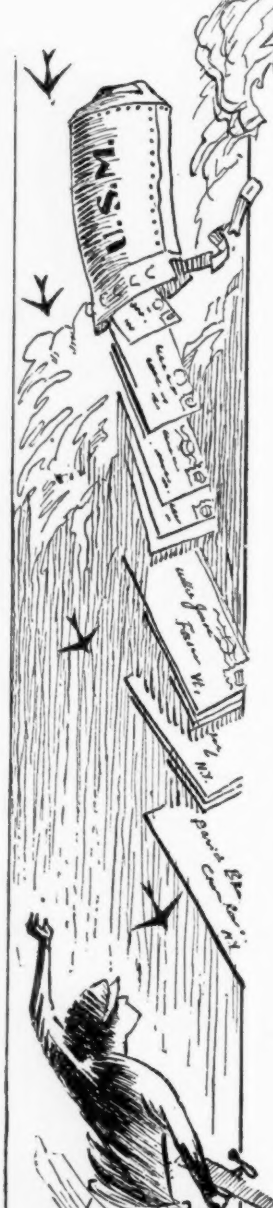
"THE ONLY MAGAZINE DEVOTED EXCLUSIVELY TO EXPERIMENTAL AVIATION"

A BOEING P.12-E OUT-MANEUVERS THE FOE

Maneuver Contest Picture No. 6

UNIVERSAL Model AIRPLANE News

VOL. IX *No. 1*



Edited by Charles Hampson Grant

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In Our Next Issue

Complete news about the 1933 National Model Airplane Championships, including winners, prizes and interesting high lights. Don't miss it.

The Model Plane Goes Aquatic, by Gordon S. Light, provides complete data to build a successful "hydro" and land plane. It is easily converted from one to the other in a few minutes and provides an interesting pastime for balmy days.

The first installment of The Fokker Fighters by Robert C. Hare, gives you many facts about and pictures of Fokker planes that have never been published in America.

Our old friend, Jack Clark, shows the advantages of many different kinds of model planes in the first installment of High Lights of Model Types.

The Dewoitine D-33 For The Scale Model Builder, by A. J. McRae, Jr. describes the construction details and provides drawings of the latest French long distance plane from which a solid scale or detail scale model may readily be made.

A War Ace Story by F. Conde Ott, the Aerodynamic Design of the Model Plane, three view drawings and many helpful design and construction hints make life more interesting for the model builder.

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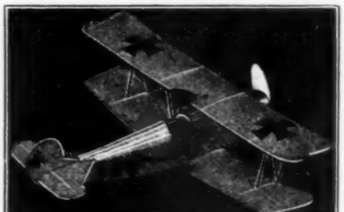

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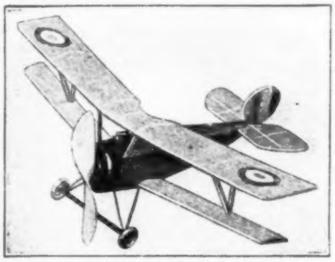

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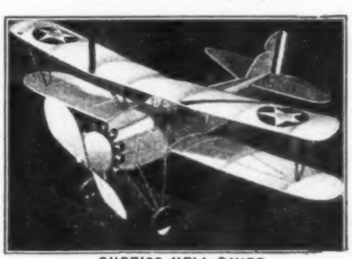

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1/8" x 3/16"	1½c	8 for 8c
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N.A.C.A. Cowling. 2" dia., each ... 14c

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1/8" x 1/4"	2c	6 for 10c
3/16" sq.	2c	5 for 9c
1/4" sq.	3c	5 for 12c
1/8" x 3/8"	2c	5 for 9c

SHEET BALSA

	24"	36"
1/32 x 2"	3c	
1/16 x 2"	4c	5c
1/16 x 3"	6c	
1/16 x 4"	9c	
3/32 x 2"	4½c	6½c
1/8 x 2"	4½c	6½c
3/16 x 2"	6c	9c
1/4 x 2"		11c

CELLULOID WHEELS

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1⅞" dia., per pair ... 16c
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1/8" dia., per ft. ... 10c
3/16" dia. Per ft. 11c
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7" dia. ... 7c — 8" dia. ... 8c

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½ x ⅝ x 6"	1c	6 for 5c
9/16 x ⅞ x 7"	2c	6 for 10c
¾ x 1⅛ x 8"	3c	3 for 8c
⅞ x 1¼ x 8"	4c	3 for 10c
¾ x 1½ x 8"	5c	3 for 13c
¾ x 1¼ x 10"	6c	3 for 15c
1 x 1½ x 8"	7c	3 for 18c
1 x 1¼ x 10"	8c	3 for 21c
1 x 1½ x 10"	9c	3 for 24c
1 x 1½ x 12"	10c	3 for 27c
1¼ x 1⅝ x 12"	13c	3 fos 35c
2 x 2 x 12"	17c	3 for 48c

DOWEL RODS

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NEW BALSA WHEELS!

NEW! Balsa Wheels

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2x3x36" ... 55c — 2x6x40" ... 95c

BAMBOO

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1/16 sq. x 12"	4 for 1c.	36 for 8c

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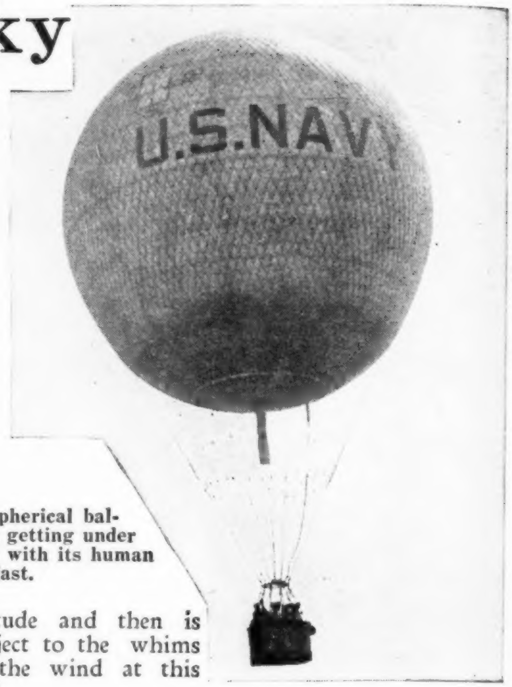
HURRY! RUSH THIS COUPON

Wanderers of the Sky

Thrills and Dangers Faced by the Balloonist and How Free Ballooning Provides Useful Training for Dirigible Personnel.

By Lt. (j.g.) H. B. MILLER

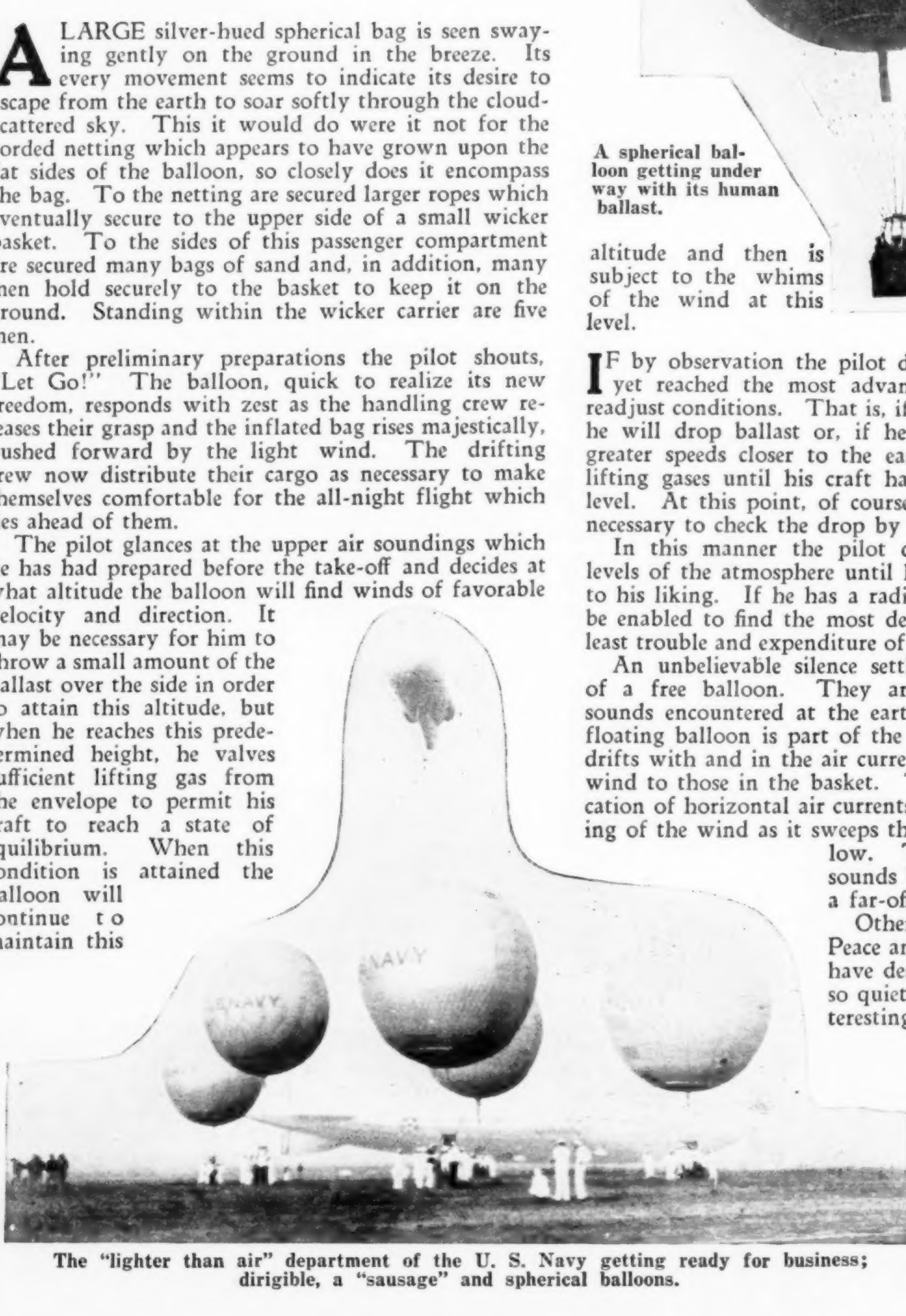


A spherical balloon getting under way with its human ballast.

A LARGE silver-hued spherical bag is seen swaying gently on the ground in the breeze. Its every movement seems to indicate its desire to escape from the earth to soar softly through the cloud-scattered sky. This it would do were it not for the corded netting which appears to have grown upon the fat sides of the balloon, so closely does it encompass the bag. To the netting are secured larger ropes which eventually secure to the upper side of a small wicker basket. To the sides of this passenger compartment are secured many bags of sand and, in addition, many men hold securely to the basket to keep it on the ground. Standing within the wicker carrier are five men.

After preliminary preparations the pilot shouts, "Let Go!" The balloon, quick to realize its new freedom, responds with zest as the handling crew releases their grasp and the inflated bag rises majestically, pushed forward by the light wind. The drifting crew now distribute their cargo as necessary to make themselves comfortable for the all-night flight which lies ahead of them.

The pilot glances at the upper air soundings which he has had prepared before the take-off and decides at what altitude the balloon will find winds of favorable velocity and direction. It may be necessary for him to throw a small amount of the ballast over the side in order to attain this altitude, but when he reaches this predetermined height, he valves sufficient lifting gas from the envelope to permit his craft to reach a state of equilibrium. When this condition is attained the balloon will continue to maintain this altitude and then is subject to the whims of the wind at this level.



The "lighter than air" department of the U. S. Navy getting ready for business; dirigible, a "sausage" and spherical balloons.

IF by observation the pilot decides that he has not yet reached the most advantageous level, he may readjust conditions. That is, if he desires to go higher he will drop ballast or, if he thinks he will attain greater speeds closer to the earth, he will valve out lifting gases until his craft has dropped to the new level. At this point, of course, he will again find it necessary to check the drop by throwing out ballast.

In this manner the pilot can search the various levels of the atmosphere until he finds a wind that is to his liking. If he has a radio receiving set, he will be enabled to find the most desirable winds with the least trouble and expenditure of ballast.

An unbelievable silence settles down on the crew of a free balloon. They are above the ordinary sounds encountered at the earth's surface. Since the floating balloon is part of the atmosphere, that is, it drifts with and in the air currents, there is no relative wind to those in the basket. The only audible indication of horizontal air currents is the occasional sighing of the wind as it sweeps through the trees far below. To those in the air it sounds like the low rumble of a far-off water fall.

Other than that all is still. Peace and tranquillity seems to have descended upon the earth so quiet it is. Particularly interesting is the flight over a forest. The slightest movement of a wild creature is evident to the crew and if they maintain a silence wild animals will be seen in abundance. Deer will be grazing without the slightest fear. Wild ducks can be seen congregating

in the hidden lakes. This type of exploring is the dream of every naturalist.

ON the other hand dogs always see a balloon at extraordinary distances. Even at night they scent the approach of the balloon and they become frantic in their efforts to leap up and tear this strange creature out of the skies.

An enjoyable phase of ballooning is to sail along at a low altitude talking with people on the ground. At every road over which the bag passes, cars stop and the passengers gaze with awe at the carefree adventurers. Even airplanes are attracted from their normal courses and often they fly around and around the drifting bag. They dare not approach too closely for the Rules of The Road give the right-of-way in all cases to the free balloon. This is logical for the pilot has no directional control of his balloon and he is helpless to prevent a possible collision with any other type of aircraft. Obviously, contact with another balloon on the same level is impossible for both bags are drifting at the same rate of speed.

Grounds for inflation. A few giant mushrooms spring up under the guiding hands of navy experts.

With the exception of geographical limitations, the length of a balloon flight is determined by the amount of ballast carried at the take-off and the skill of the pilot in conserving his disposable weights. As the balloon alternately rises and descends as the pilot endeavors to take advantage of the most favorable winds, the ballast will eventually be expended. Of course, a certain amount of lift is also lost as the gas is valved but in the normally designed balloon, the ballast will be expended before the lift is diminished to a dangerous degree. Were such a condition to arise it would be quickly corrected by further expenditure of ballast and, hence, the ballast would disappear first. Because of this fact ballast is used sparingly. The winner of a balloon race is the pilot who is able to use the best winds with the least loss of ballast. A certain amount of ballast must be retained to the last in order to check the fall should the final descent of the bag reach dangerous velocities.

It is hard to keep a good man down. As can be seen here a large crowd is required. The Balloon is ready to take off.

DRY sand is ordinarily used for ballast for it can be disposed of in minute quantities. It also is easily obtainable. However, anything could be used as weight. One Navy pilot on his first solo flight found himself being dragged through a peach orchard on the take-off. Green peaches were torn from the trees and they deluged the basket filling the entire bottom. This was sufficient to make the balloon heavy and in order to reach a safe altitude the quick-witted pilot began to throw peaches overboard one at a time until his craft became light enough to rise. Imagine the consternation of farmers to see a green peach occasionally drop from the floating bag high above!

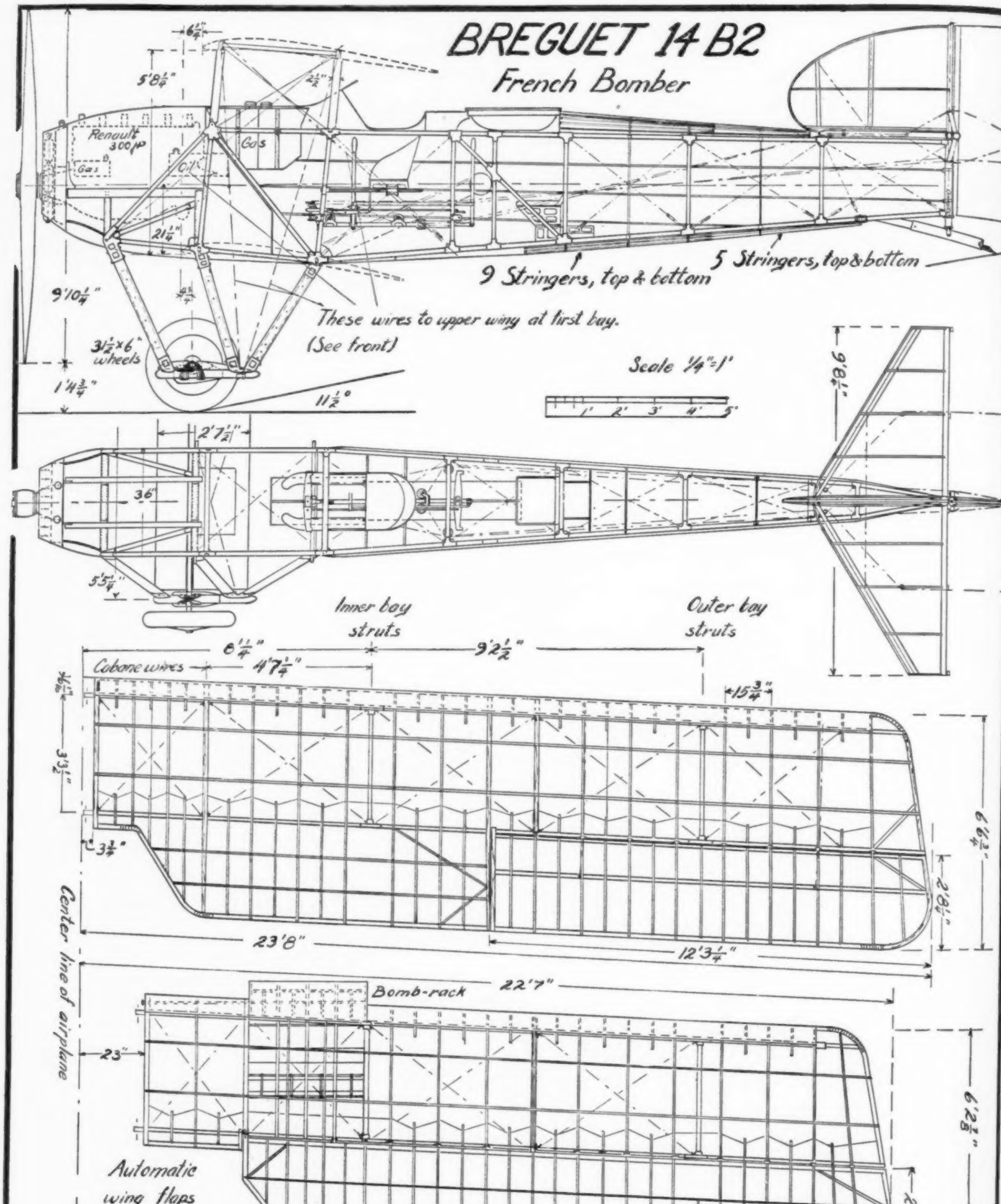
Racing pilots use sand by the half-handfuls and if the contest appears to be close they even resort to using their instruments, food, and safety equipment as ballast in their endeavors to keep in the air as long as possible.

Another means of maintaining a constant altitude is to use the drag-rope method. The drag-rope is a heavy line about 200 feet in length which is lowered from the basket. As the balloon gets close to the earth the weight of the rope is taken up by the ground. This, of course decreases the weight actually acting on the balloon. The bag will immediately reach equilibrium and will continue to drift on at this constant altitude. Frequently, farmers will run out and grasp hold of the drag-rope thinking the crew are in trouble. Often they playfully refuse to let go until pulled off their feet by the wind. Or, the pilot may release a bit of ballast and pull the joker into the air. He never fails to let go under these conditions.

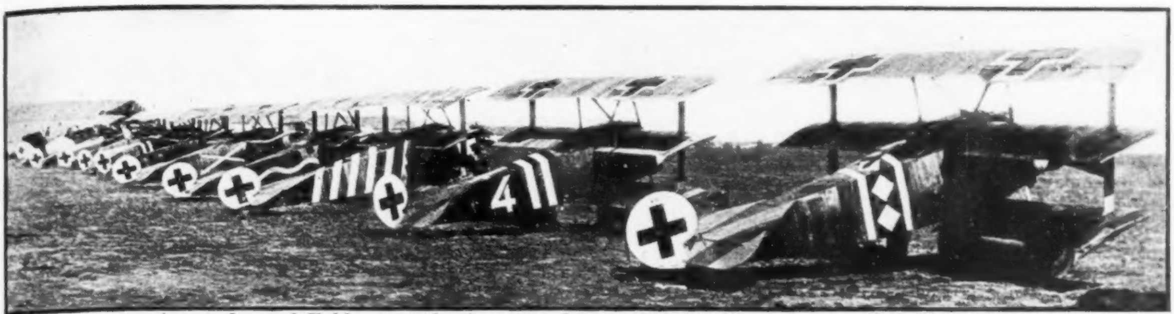
A heavily wooded area offers good sport for a bal-

(Continued on page 43)

Equipment to meet all emergencies is carried on flights in U. S. Navy balloons.



BREGUET 14 B2
French Bomber
Renault 300 HP
Gas
Oil
9 Stringers, top & bottom
5 Stringers, top & bottom
These wires to upper wing at first bay. (See front)
3½×6" wheels
Scale 1/4"=1'
1' 2' 3' 4' 5'
Inner bay struts
Outer bay struts
Cabane wires
Center line of airplane
Bomb-rack
Automatic wing flaps
Elevator
Rudder
Top
Line of thrust
Stockton R. Ferris, Jr.



A squadron of Fokkers at the front, ready to raid the Allies. (Actual War Picture)

The Man They Left Behind

How A Flying Rookie Starts On The Road To "Acehood" and Proceeds To Prove Himself To Be Flying Death To The Enemy

By F. CONDE OTT

THE cheery smile that creased young lieutenant Gabriel Guerin's face, belied his heavy heart as he waved a brave farewell to the ten Spads that bumped across the rough new surface of the small flying field and disappeared into the morning mists. For years he had hoped to fly—to fight in the air for France. When he was once accepted by the Air Corps he thought he would never spend another unhappy moment.

Evidently his horn of happiness had sprung a leak. The night before, when the Flight Commander had read off the names of the ten men who were to make the trip of the morrow, Guerin's name was not among them. Commander Berreux must have sensed the disappointment and sorrow in young Guerin's heart for he confided to this newcomer of Spad 15 that the journey was to be a hazardous venture. Only experienced men, tried under the gruelling fires of active combat, were selected for such tasks.

When the last fading drone of the disappearing ships had died off, Guerin turned with heavy step and heart toward the hangar.

"How could a man ever learn to fight in the air if he was never given the chance?" He was turning this perplexing question over and over in his mind when the settling stillness of the deserted airdrome was punctured by the low hum of a distant motor.

The Boche ship burst into a flaming mass. (A Junkers Armored Plane)

Guerin's heart skipped a beat or two. Maybe one of the men had had engine trouble and turned back. Maybe, tyro that he was, he would be ordered to replace the disabled veteran. Maybe—but engines don't hum so smoothly when in trouble. What was it then?

The same curtain of fog that had so abruptly obliterated his companions after their take-off, now prevented Guerin from locating the oncoming ship. As it came closer, however, a momentary rift in the low clouds gave Guerin a glimpse of the approaching craft. Mingled emotions, surmounted by an urge to action, surged through Guerin as he recognized the wing markings of the visitor, great maltese crosses that betokened the enemy he had hoped so long to meet.

The years of military training, however, were soon asserting themselves and the young lieutenant acted with dispatch. Fortunately his own ship had been warmed up with the others and was thus ready for immediate service. In a twinkling Guerin was at the controls, had the motor wide open and was racing across the airport himself. Once in the air he circled about seeking both altitude and the invader at the same time.

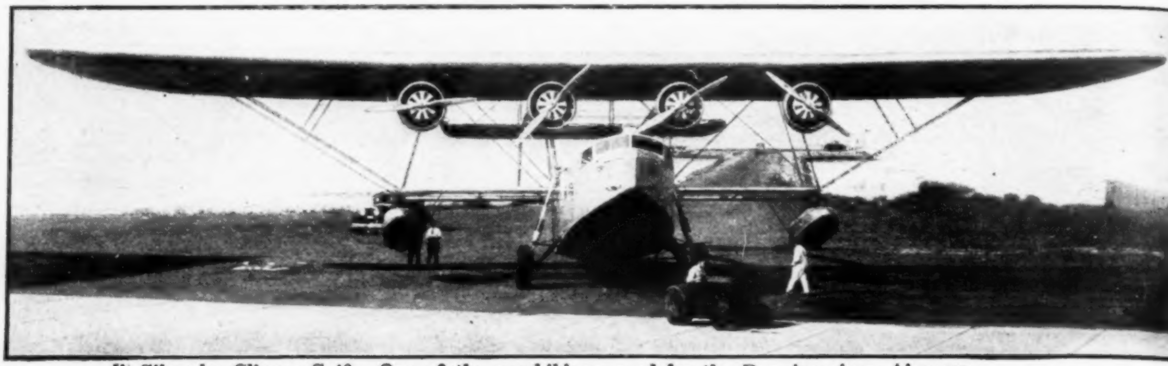
The baffling fog was soon a rolling bank of fleecy sunlit clouds beneath him as the Frenchman's ship responded to his urgings. Here in the open he swept his gaze all about him, hastily searching for his opponent. The latter was nowhere to be seen.

INVOLUNTARILY Guerin muttered a few harsh words about his seemingly endless misfortune. When at last a chance came to fight, the foe flew off. This moment of disconsolation and brooding was rudely shattered by a strange whistling sound that went by his ears. Neat little holes suddenly appeared on the clean, new wing coverings of his craft.

In a flash the awful truth came to Lt. Guerin. Fledgeling that he was, he had let himself be completely tricked by an old ruse of the wartime aviators. The German had anticipated his arrival above the clouds so he had flown off to the east against the sun.

Blinded by its strong light Guerin had failed utterly to see the Boche silhouetted against Old Sol who

(Continued on page 40)



A Sikorsky Clipper S-40. One of the amphibians used by the Pan-American Airways.

Flying Boats vs. The Atlantic

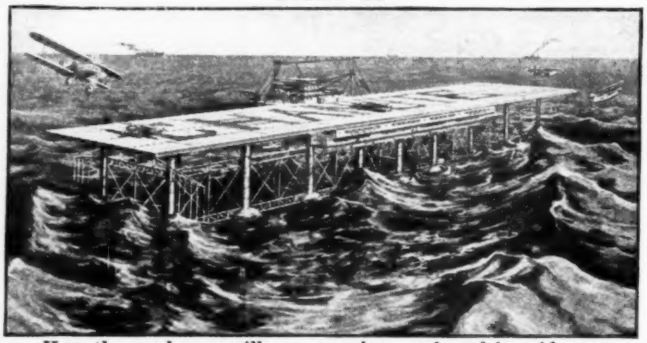
Developments That Promise to Establish the Superiority of the United States in Trans-Oceanic Air Transportation

By ALEXANDER KLEMIN

Prof. of Aeronautical Engineering, N.Y.U.

PART II

THE American Navy has always fostered the large flying boat for its long range fleet patrol work, but it naturally could not foster the development of purely commercial seaplanes. It remained for Pan-American Airways to give the necessary impetus to American flying boat construction. Pan-American Airways now operates 26,000 miles of airlines. From Miami, Florida, to Havana, and the Caribbean, to Panama, Trinidad, Pernambuco, Rio de Janiero, and Buenos Aires, as well as the west coast of South America, Pan-American has earned for itself a wonderful reputation for regularity and safety of service. On the Pan-American airlines one of the most useful ships is the Sikorsky Clipper, a four engine boat, which has now been in service for more than two years in the Central and South American airlines, including in its operations a straight water jump of over 500 miles between Miami, Florida, and Barranquilla, Columbia. The Clippers are equipped with four Pratt & Whitney Wasp engines, have a gross weight of 34,000 pounds fully loaded and are capable of carrying 40 passengers at a cruising speed of 115 to 125 m.p.h. The Clipper proved a stepping stone to larger craft.

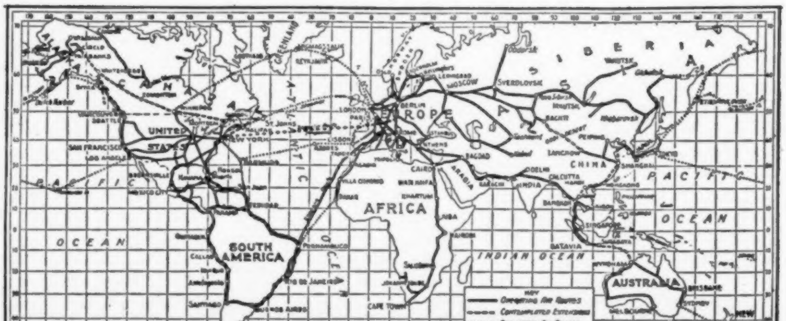


How the seadrome will appear when anchored in mid-ocean, as a landing oasis for planes.

An Ambitious Undertaking

The young and ambitious President of Pan-American, Juan Trippe, aided by the advice of Colonel Charles A. Lindbergh and Chief Engineer A. A. Priester, drew up a very severe specification for even a larger craft than the Sikorsky Clippers, to be put into oceanic service. All the lessons which had been learned on the Clippers were taken into account. All the best brains of the American constructors were drawn into service by means of a design competition.

After many months of effort by the manufacturing firms and after careful selection by the advisers of Pan-American, two manufacturers were tentatively granted contracts. These were the Sikorsky Manufacturing Company and the Glenn L. Martin Company. At the time of writing it is understood that three boats have been definitely ordered from Glenn L. Martin and three from the Sikorsky Manufacturing Company, at a total of $1,750,000.00. Four hundred men have gone to work at Stratford, near Bridgeport, where the Sikorsky plant is located and a similar number have been recalled to the Baltimore plant of Glenn L. Martin. Thus aviation is doing its share in putting men to work and in bringing back happier days.



Courtesy The New York Times

Operating air routes, contemplated extensions, and projected air routes of the world, for both plane and airship

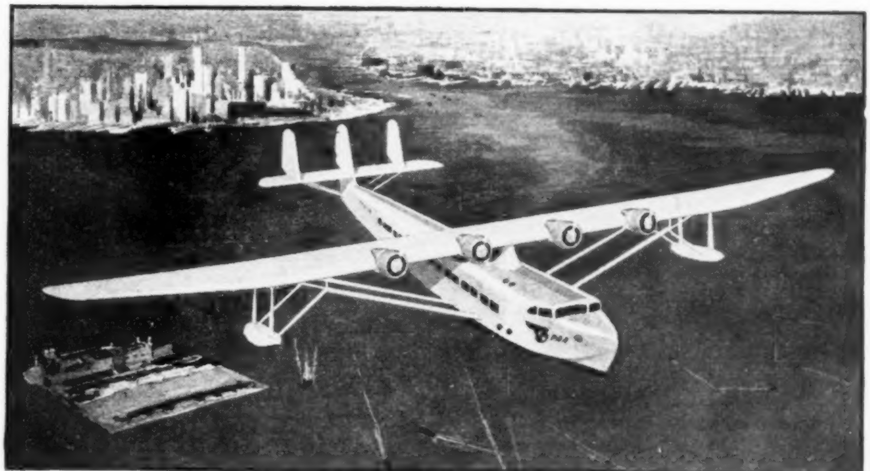
The Boats to be Built

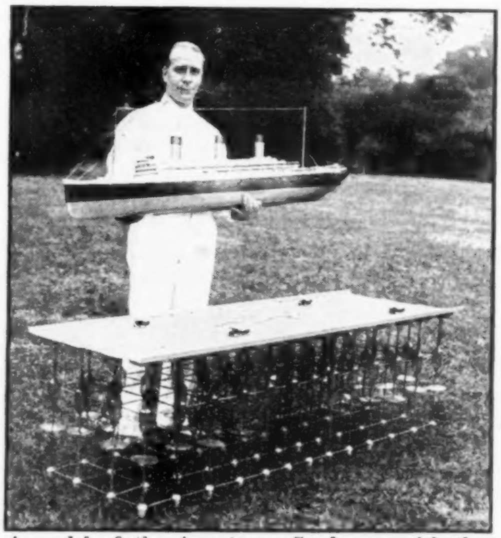
THE boats under contract

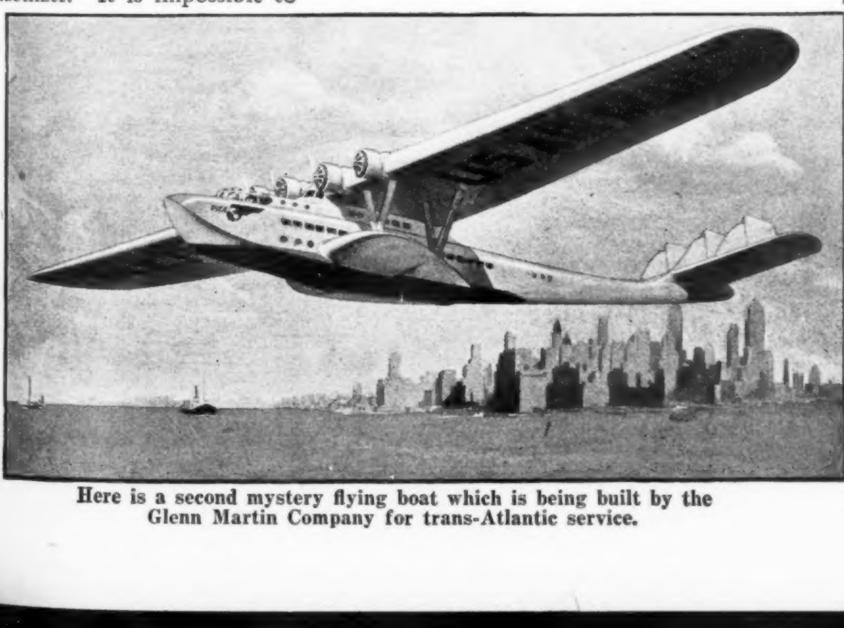
will have the most luxurious passenger accommodations, with comfortable and adjustable seats, tables, large window space, and head room, smoking compartments, card tables, overhead lighting, complete ventilation, emergency exits out of the top of the central hull and every known aid to navigation and safety.

The designers of these craft are naturally rather secretive about exact characteristics of their ships. We know definitely however that the new ships will be powered each with four 700 h.p. radial air-cooled engines. As the artist's conceptions of these ships show, both will be high-wing monoplanes with the engines carefully faired into the leading edge of the wing. According to the specifications, the boats will be capable of a range of 2500 miles; they will carry 50 passengers on South American service and presumably a somewhat smaller number when used on trans-oceanic flight. The cruising speed will be in excess of 125 m.p.h.

The two ships are very similar in general appearance. Each will have wing tip floats placed far out on the wing providing the lateral stability which we have spoken of before. Each ship will be provided with a long hull, giving plenty of fore and aft stability in the water. Each ship will be equipped with three rudders mounted on top of the single stabilizer. It is impossible to get the huge rudder area required in one surface, nor is it considered desirable to do so.


The new Sikorsky mystery flying boat, now being built especially for trans-Atlantic service.


A model of the Armstrong Seadrome, with the inventor holding a model of an ocean liner to show its relative size.


Here is a second mystery flying boat which is being built by the Glenn Martin Company for trans-Atlantic service.

In each design, the engineers have been very careful to carry the tail surfaces far out of the water so that they cannot be damaged by rough seas. The prow of the Glenn Martin boat is very high in order to secure additional seaworthiness. Even though information is jealously guarded, we can readily surmise that these new designs will certainly meet all the requirements that we have outlined previously.

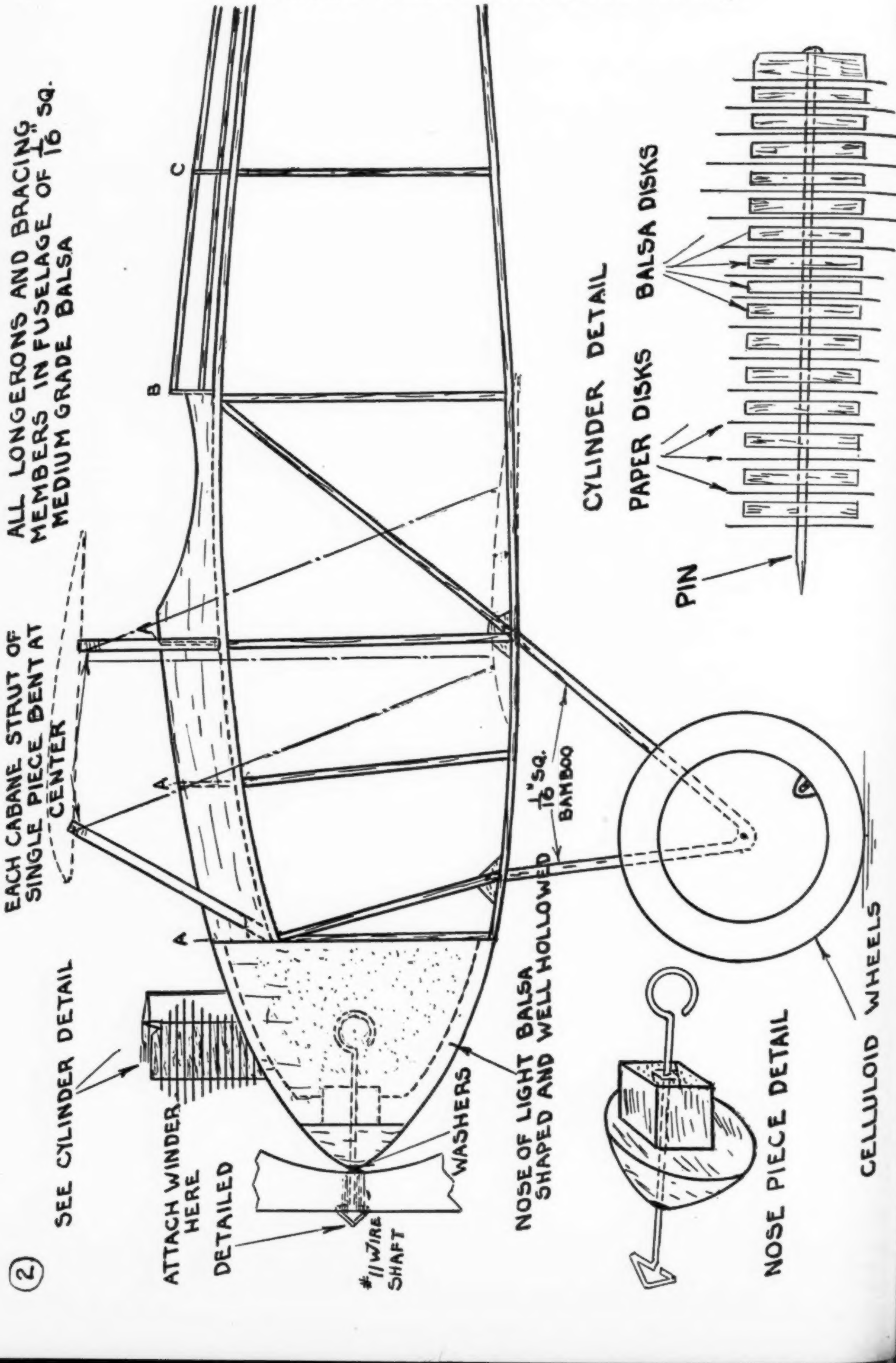
Routes to be Followed

THANKS to the courtesy of the New York Times we are publishing a map which shows world air routes, with contemplated extensions.

Pan-American is equally secretive regarding the services to which these new boats are to be put. Will they be used on the relatively short northerly route between Newfoundland and Iceland where fogs and storms are always to be feared or will they fly over the most northerly route over Greenland, Iceland and the North of Scotland, where climatic conditions are certainly no better than on the Newfoundland-Iceland route?

Perhaps they will follow the more circuitous southerly route from New York to the Bermudas, from Bermuda to the Azores, from the Azores to Lisbon, and then north to London or

(*Continued on page* 44)


2
EACH CABANE STRUT OF SINGLE PIECE BENT AT CENTER
ALL LONGERONS AND BRACING MEMBERS IN FUSELAGE OF 1/16" SQ. MEDIUM GRADE BALSA
A
A
A
B
C
SEE CYLINDER DETAIL
ATTACH WINDER HERE
DETAILED
#11 WIRE SHAFT
WASHERS
NOSE OF LIGHT BALSA SHAPED AND WELL HOLLOWED
1/16" SQ. BAMBOO
CYLINDER DETAIL
PAPER DISKS
BALSA DISKS
PIN
NOSE PIECE DETAIL
CELLULOID WHEELS

How to Build the Submarine Scout

Complete Instructions and Plans For You to Create a Flying Scale Model of the U. S. Navy XS-1

By JOHN P. TYSKEWICZ

A flying scale model of the U.S. Navy XS-1. It flies for 60 seconds.

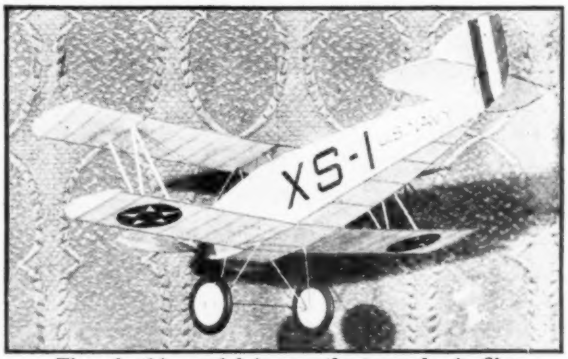
IT HAS long been the dream of the airplane designer to create a super but miniature craft so compact in form that it could be housed readily aboard a submarine. This rather formidable task was undertaken by expert Navy designers, with the resulting production of the extremely small U. S. Navy XS-1. This was the first of what may prove to be a deadly weapon in warfare.

It is a small biplane of approximately eighteen feet span which can be carried in knockdown form within a cylinder that is carried upon the afterdeck of a submarine. This little ship, built by the D. Martin and Cox Klemin Companies, can be assembled in a very few minutes. The power is supplied by a Wright "Gale" 60 h.p. engine. Pontoons were used but the undercarriage was interchangeable so that the ship could be equipped with wheels when required.

This type of airplane lands itself readily to the construction of an excellent flying scale model. After having built and flown a model of this type, the author was well rewarded by its performance.

If you follow these instructions carefully, you should be able to build one of the finest flying scale models that you have ever seen.

Before constructing the model, the reader should understand that in order to get the performance of which this model is capable, he should make it reasonably light. The model shown in the photographs weighs .63 oz. minus the rubber motor. All the balsa used is of medium weight grade. If other wood is used, vary the sectional dimensions accordingly.



Though this model is exactly to scale, it flies beautifully because of its excellent design.

Fuselage

From a 1/16" sheet slice out 7 or 8 1/16" square lengths. Drawings No. 2 and No. 3 giving the side view, are used by laying two pieces together for the top pair of longerons and two for the bottom pair. By spreading the drawing over a board and using pins or brads the longerons are bent and held in shape. Do not bend by heat or steam, it is unnecessary.

The inside braces are then cut and inserted by pairs. When completed and dry, separate the sides and cement in the top and bottom braces, beginning from the front. The turtle-back formers, plate No. 5 are cut from 1/32" balsa sheet as shown. After assembly, the other two notches and stringers, 1/16"x 1/32" are added. Notching after assembly insures a lined-up job. The cowling, plates No. 2 and No. 4, is made up of two separate pieces with the seam or joint lengthwise. A piece of 1/64"x2⅝"x1½", is cemented to the top center longerons, half-way overlapped. Since it is difficult to bend the balsa both ways as required by the curved fuselage, the sheet must be forced down and held until it remains close to the top longeron sides. The other side is treated the same way. It is advisable to have the nose block cemented on to the fuselage before the cowling is attempted.

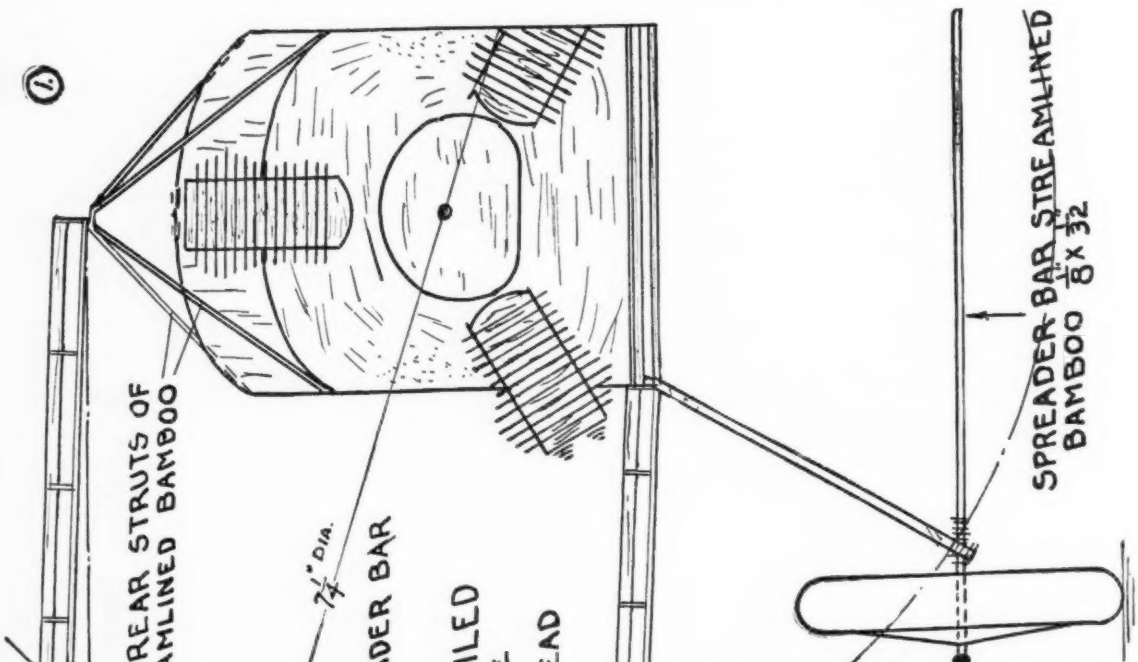
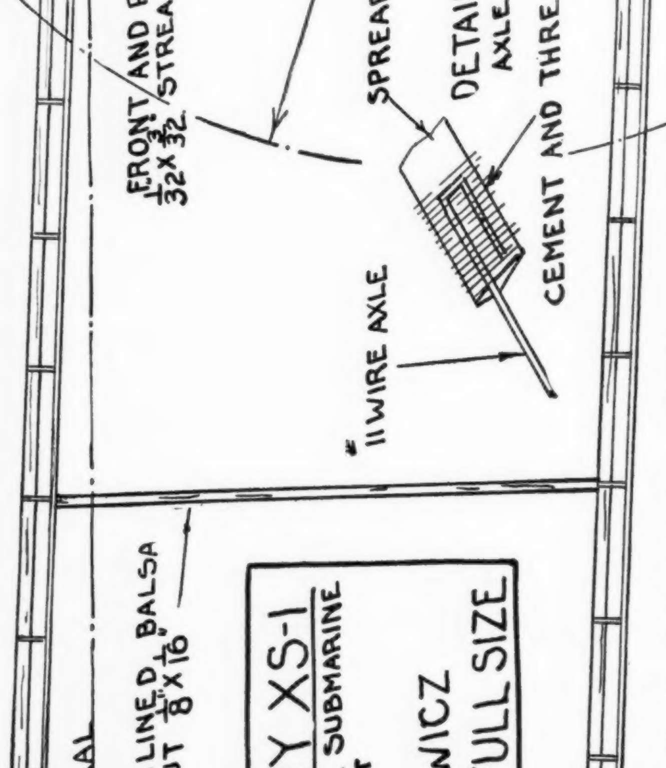
THE cockpit portion is also covered with two separate sheets. The nose is shaped from a light balsa block and well hollowed. The nose piece No. 2 is cut off the shaped nose and a ⅜" cube cemented to the inside face. Washers are imbedded on both sides for the prop shaft. A ⅜" square hole is cut out for the nose piece. The landing gear is made by bending a piece of bamboo 1/16"x⅛"x6" near the center, cut to the correct height and carefully split so as to yield two identical pieces. The ends are then sharpened and coated with cement. Using a needle, force holes through the longerons and gussets, No. 2, coat insides with cement and then force in the landing gear struts.

When dry, add a little cement around the entire joints.

The spreader bar, No. 1, is of ⅛"x1/32"x4¼" bamboo, well streamlined. Two axles are then bent from No. 11 piano wire as shown, and fastened with cement and thread. The spreader bar is then lashed to the landing gear and wheels slipped on. A drop of cement on the axle tip will keep them on.

The "rudder" is made by heating a bamboo piece 1/32"x1/32"x9" to shape No. 3, cut to size, ends sharpened, coated with cement and forced into the balsa top stringer and bottom of the rudder post. Before adding the rudder post, the tail hook, No. 3, is bent from No. 11 piano wire and fastened to the fuselage end, using cement and thread.

The "elevator" is made by heating a piece of bamboo 1/32"x1/16"x9½", to shape No. 5, and carefully splitting so as to give two identical halves. The stabilizer end is spliced and after the fuselage is cov-

ered, it is cemented to the top stringer and the rudder post.

The construction of a cylinder for the three-cylinder motor is shown in detail on plate No. 2. From a 1/32" sheet, 15 balsa disks per cylinder are cut or punched out. A thin walled pipe 7/16" in diameter may be used as a cutter or punch. 16 paper disks are then cut out in similar fashion for the air-cooling flanges.

The cylinder is assembled as follows: A balsa piece 7/16"x1/16"x1/4" is slipped on a wire pin, then a paper disk with a drop of cement on the inner side, then a balsa disk with a drop of cement, paper disk, etc. When completed, the cylinder is colored gray. Make the other two the same way.

To attach on nose or cowl, recess out a shallow hole which each cylinder is to occupy, cement in cylinder, add paper rocker arms and small wire pushrods as shown. Note photographs show model without motor (not finished) which necessitated adding a little nose weight in lieu of the motor. If motor is left out entirely, have that added weight in the form of a heavier prop.

The cabane or center section struts are made by bending a piece of streamlined bamboo 1/32"x3/32"x4 3/4" for the front strut at its center and a piece 3 1/4" long for the rear strut. When cut to the correct height, No. 1, 2, 4, they are cemented to the fuselage top longerons. As they will pierce the cowling, cement will be sufficient in holding them securely. The struts should give the top wing approximately 3/32" incidence. The bottom wing will be set at zero degrees incidence.

Wings

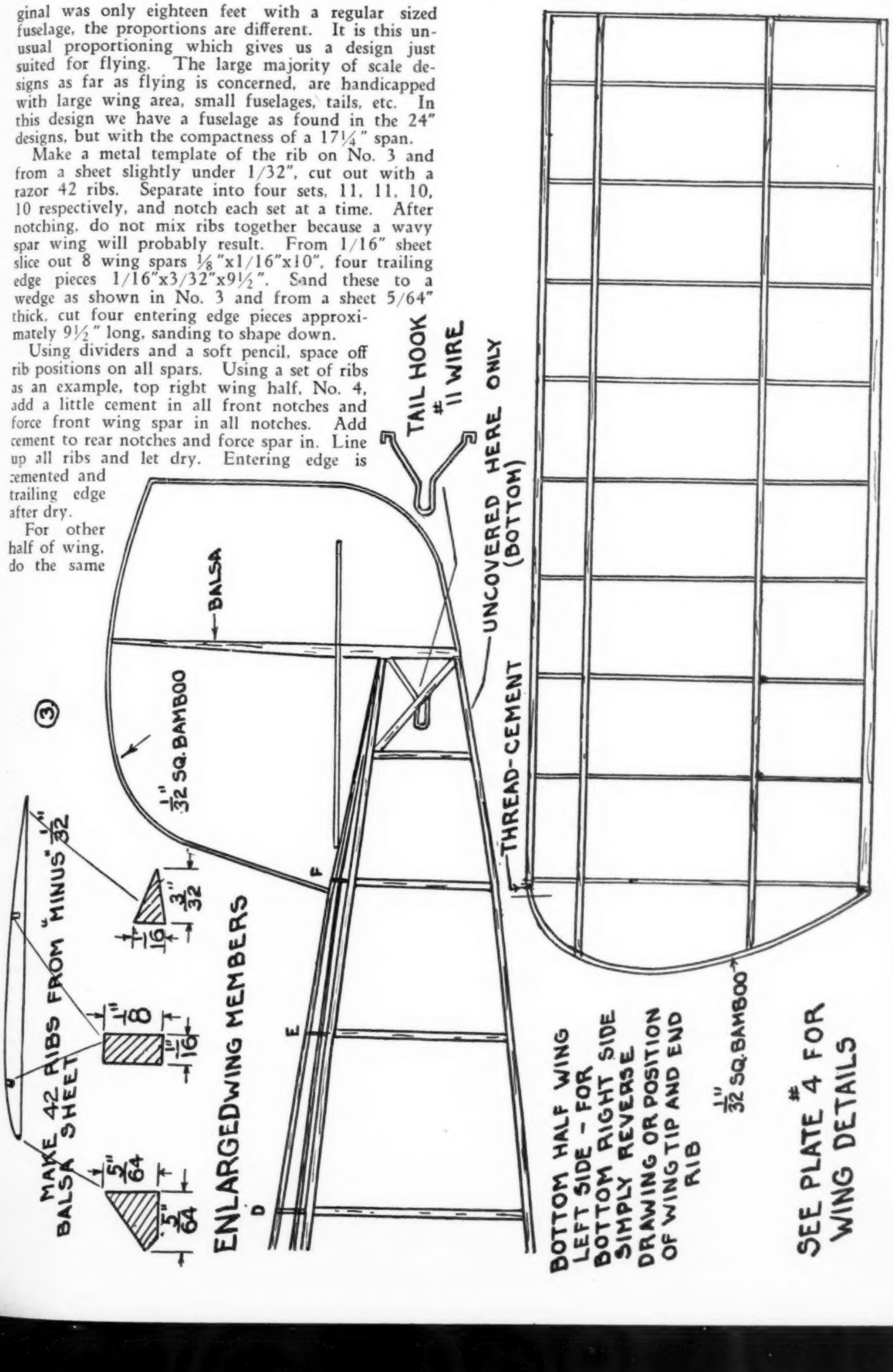
FOR a fuselage of such cross sectional area and size, the wings seem to be abnormally small when compared to other designs. We must remember that since the span of the ori-

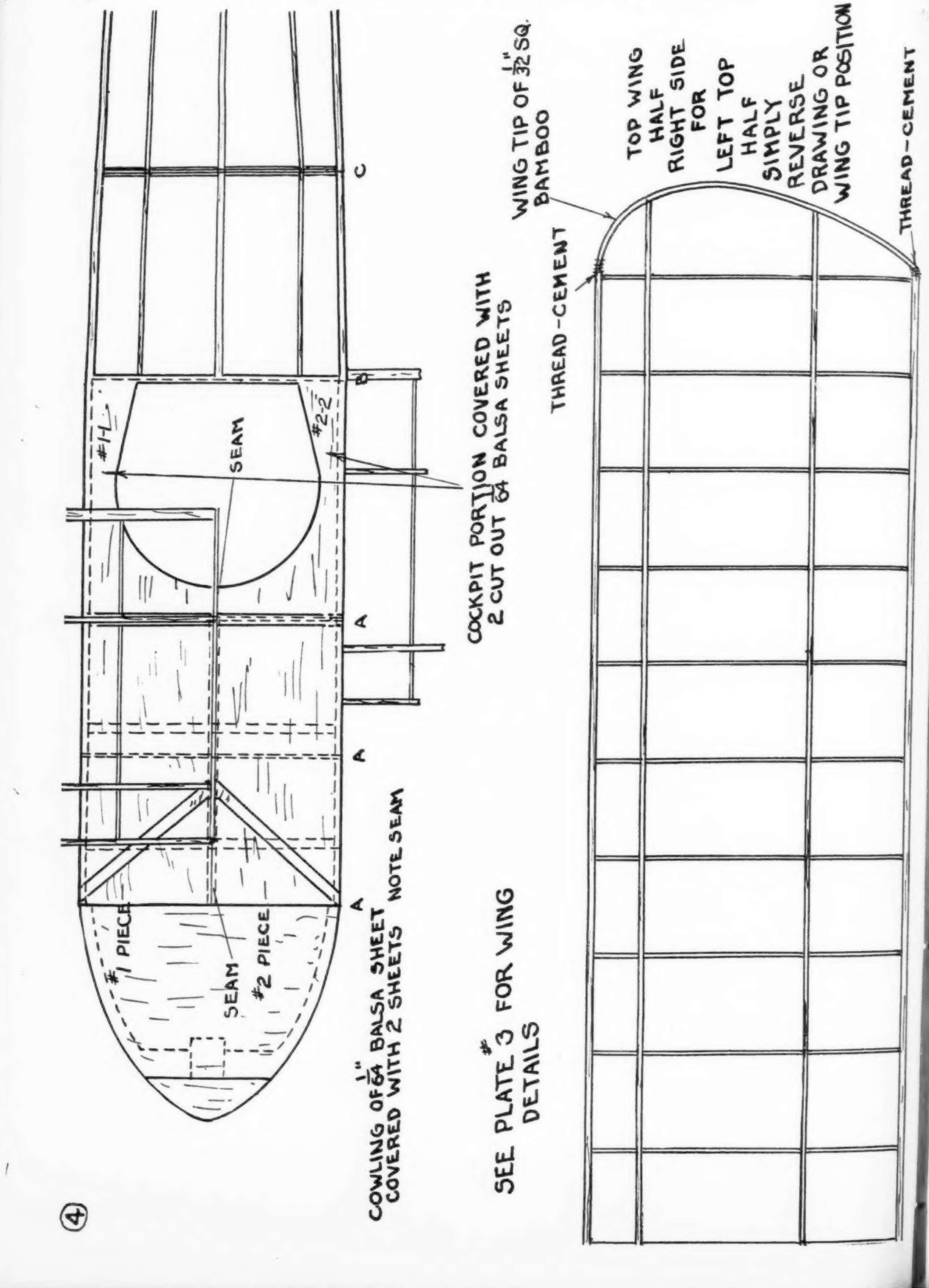
ginal was only eighteen feet with a regular sized fuselage, the proportions are different. It is this unusual proportioning which gives us a design just suited for flying. The large majority of scale designs as far as flying is concerned, are handicapped with large wing area, small fuselages, tails, etc. In this design we have a fuselage as found in the 24" designs, but with the compactness of a 17¼" span.

Make a metal template of the rib on No. 3 and from a sheet slightly under 1/32", cut out with a razor 42 ribs. Separate into four sets, 11, 11, 10, 10 respectively, and notch each set at a time. After notching, do not mix ribs together because a wavy spar wing will probably result. From 1/16" sheet slice out 8 wing spars ⅛"x1/16"x10", four trailing edge pieces 1/16"x3/32"x9½". Sand these to a wedge as shown in No. 3 and from a sheet 5/64" thick, cut four entering edge pieces approximately 9½" long, sanding to shape down.

Using dividers and a soft pencil, space off rib positions on all spars. Using a set of ribs as an example, top right wing half, No. 4, add a little cement in all front notches and force front wing spar in all notches. Add cement to rear notches and force spar in. Line up all ribs and let dry. Entering edge is cemented and trailing edge after dry.

For other half of wing, do the same




4
COWLING OF 1/64" BALSA SHEET
COVERED WITH 2 SHEETS
NOTE SEAM
#1 PIECE
SEAM
#2 PIECE
A
A
A
B
C
#1-1
#2-2
SEAM
COCKPIT PORTION COVERED WITH
2 CUT OUT 1/64 BALSA SHEETS
SEE PLATE #3 FOR WING
DETAILS
THREAD-CEMENT
WING TIP OF 1/32" SQ.
BAMBOO
TOP WING
HALF
RIGHT SIDE
FOR
LEFT TOP
HALF
SIMPLY
REVERSE
DRAWING OR
WING TIP POSITION
THREAD-CEMENT

throughout except that the tips are reversed as noted. The bottom wings, No. 3, are also treated in the same way. The tips are made of bamboo 1/32"x⅛" bent to shape over heat and carefully split in four identical tips. After cutting to size, the wing tips are cut to the proper length and tapered, No. 1. The bent tips are then cemented and wrapped with a few turns of thread. The two top wing halves are cemented together with a 5/16" dihedral. When dry, the double thick center rib is notched slightly below both wing spars so as to fit to the cabane later on.

Propeller

The prop is carved from a blank 7¼"x1½"x¾". The blank is cut out using a chisel or coping saw to the outline shown, No. 5. Do not round off tips of blank in any way. The underface of the blank is cut and carved out with an average under-camber of about 1/16".

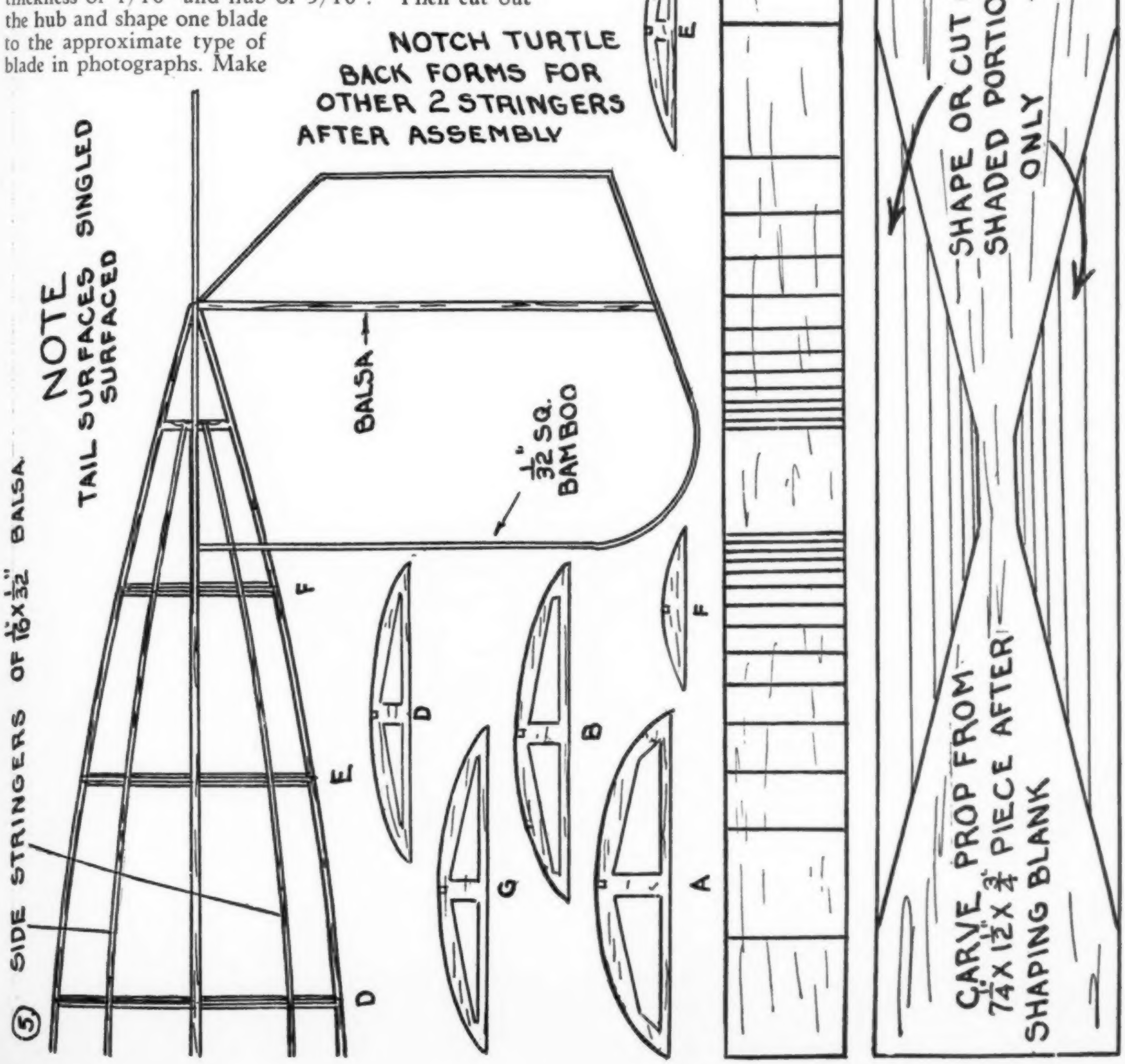
When one underside is finished, do the other in the same way. After both undersides are carved, sand to take out knife marks. Then carve the opposite or top surface to about ⅛" average thickness. Do same to other side and finally, carefully carve to a blade thickness of 1/16" and hub of 3/16". Then cut out the hub and shape one blade to the approximate type of blade in photographs. Make a paper template of the shaped blade and use on the other blade. The knife is again used, trimming and cutting the entering and trailing edges to a typical airfoil section.

The prop is now sanded and balanced. To strengthen and give a smooth blade, the prop is finally doped and lightly sanded. The prop shaft is bent from No. 11 piano wire as shown in No. 2. First bend the triangular end. Force it through the prop hub, slip on and imbed a U shaped washer, fastening the shaft to the prop, using cement and thread wrapped around the hub and through and around the triangular bend. When this is done, the actual nose piece is slipped on, No. 2 and the shaft bent in a round hook for the rubber.

Covering

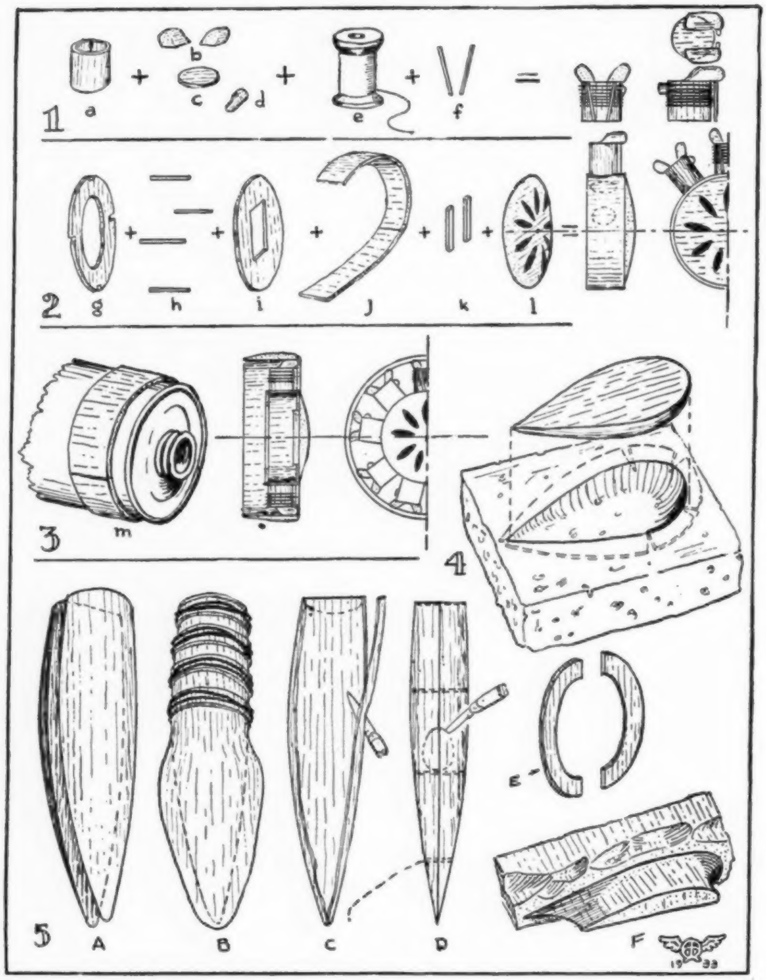
THE entire model is covered with natural tissue which incidentally resembles the Navy color with

(*Continued on page* 36)



Helpful Hints for the Model Builder

By ALAN D. BOOTON



INTO the valley of sheet balsa we go. There are several kinks that will test the amateur's ability in these hills of words.

Figs. (1) and (2) show the evolution of a dummy motor, part by part. In Fig. (1), (a) is a hollow tube of sheet balsa. A long tube is made by sanding 1/32" sheet balsa smooth, scalding with boiling water, rolling it around a curtain rod with a bandage, and drying in a moderate oven. Cement the seam, then cut the sections of balsa tube while the tube is still on the rod. Carve the valve heads (b) and balsa disc (c). When the head has been assembled, wrap thread around the cylinder, half-way down and cement (d) in the position shown on the finished cylinder. 1/32" round bamboo is the best for push rods, but these are not fitted until the cylinders are in place on the crank case as shown in Fig. (2).

In Fig. (2), two formers (g) and (i) are made from very thin balsa and assembled with the four balsa spacers, (h). This frame is now covered with strips of very thin sheet cemented together to make a simple strip (j) long enough to fit around the frame. The strip cemented on the frame (g, h, 1) and held in place with rubber bands. (l) is the nose piece and is fitted with two strips of balsa (k), to hold it in place against the newly-made crankcase. When the strip (j) has set to the frame (g, h, 1), the cylinders are ready to cement on at equal distances apart, three, five, seven or nine cylinders, to suit the builder. When the cylinders have set to the crankcase, the push rods may be fitted on, two to a cylinder as shown.

Fig. (3) shows how a ring may be added to the motor. Make a strip of sheet balsa thicker and longer than was made for (j), but follow the same method. To get the proper shape, hold it on a can of the proper diameter with rubber bands. When it is dry cement the seam and streamline with sandpaper as shown in motor section of Fig. (3).

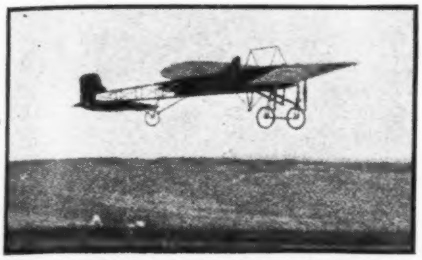
It will be easier to color the ring and motor before assembling the two as a unit. A suggested color scheme would be black cylinders with aluminum colored push rods. The remainder of the unit may be colored to suit. The motor just described is of the simplest type and has proven lighter than the less realistic celluloid motor, so you may change the general shape of the cylinders by adding paper flanges instead of thread; flange the valve heads, add spark plugs and wiring, and intake and exhaust manifolds.

IN Fig. (4) is a form for making hollow sheet balsa pants. Two solid halves of wheel pants are made and coated 1/32" thick with hot paraffin. When cold, a cardboard fence is placed around them and poured full of plaster of Paris. Warm the mold and remove the balsa halves and then the paraffin on the halves. After the paraffin is off, the halves will and must have 1/32" clearance all around. Experiment with *unsanded* medium 1/32" sheet balsa patterns, similar to the one designated by dotted lines in Fig. (4). Wedges should be cut out as shown so that they press into the mold without buckling against the pants half that is used to press it in. Enough sheet should remain above the mold to trim to an even plane so the two halves will fit together evenly to make one of a pair. After the sheet halves have dried, cement the wedge, cut seams on the inside while still in the form. This prevents distortion due to the pull of the cement. Holes for the wheels are cut after the halves have been cemented together and discs of thicker sheet balsa are cemented inside where the axle and wires pass through. Sanding and coating with dope makes a neat, extra light pant.

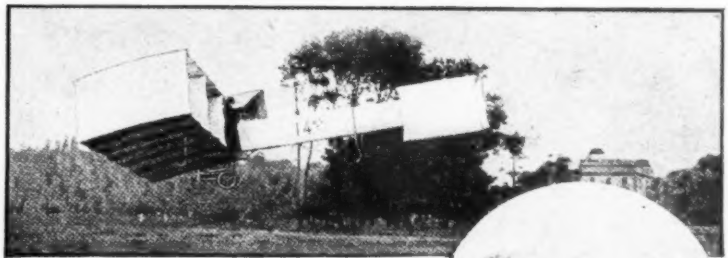
Fig. (5) is worked somewhat similar to Fig. (4) and may be done in the same manner the wheel pants were, only it is more difficult.

Fig. (5). (A) shows two halves of a solid

(*Continued on page* 36)



Louis Bleriot in his monoplane that flew across the English Channel.



One of Santos Dumont's first "box kite" airplanes that flew successfully.

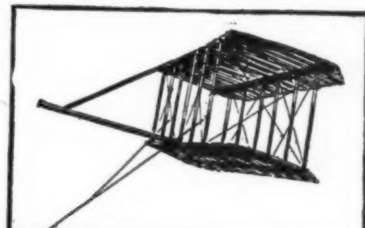
One of the early Santos Dumont Demoiselle monoplanes. Its wing span was sixteen feet.

Who Developed the Aeroplane?

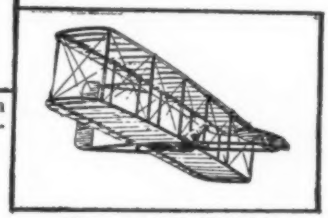
Pioneers of Aviation and How They Laid the Foundation of Aeronautic Science

By ALLEN R. MOULTON

PART THREE



The Wright Brothers' kite used in making experiments with heavier-than-air craft.



The original Wright Glider, 1900

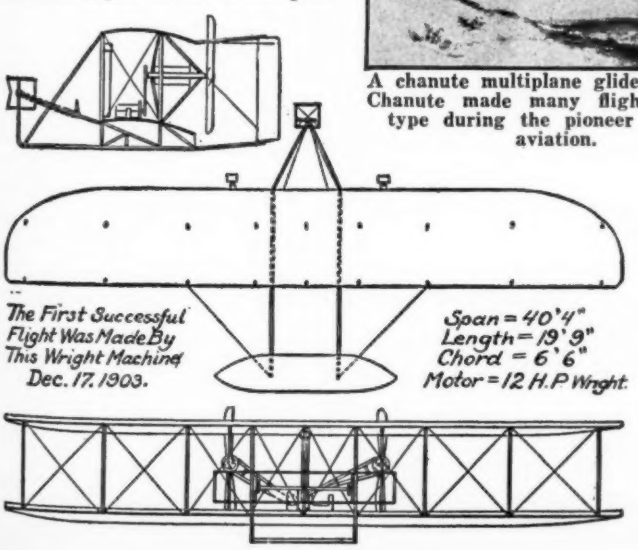
NOW we enter the most important era of aviation: namely ,the period from 1896 to 1906. During this time the aeroplane made its first really successful flight and aviation was born to a wondering world.

The first man we take note of in this period is Octave Chanute, a well known American railway engineer, who, in 1896 became vitally interested in aviation. He decided that gliding was the only course to follow so as to obtain practical data on aviation. So he started building gliders, but as Chanute was an old man it was necessary for him to have a younger assistant. Luckily enough, he was able to acquire the services of A. M. Herring, who had had much experience in the art of gliding.

When Chanute started his work in aviation, he decided that artificial flight involved the practical study of ten problems, ie.:

1. The resistance and supporting power of air.
2. The motor, its character and its energy.
3. The instrument for obtaining propulsion.
4. The form and kind of the apparatus.
5. The extent of the sustaining surfaces.
6. The material and texture of the apparatus.
7. The maintenance of equilibrium.
8. The guidance in any direction.
9. The starting up under all conditions.
10. The alighting safely anywhere.

A chanute multiplane glider in flight. Chanute made many flights in this type during the pioneer days of aviation.



Chanute considered the seventh problem the most important to be studied. Therefore, he and Herring concentrated on this feature. At first they used the Lilienthal type machine, but finally Chanute embodied his own ideas into gliders of an original design. These gliders were all of the multiwing type, the most successful being the two surface or biplane type.

The trials for all his glider work were carried out at Dunne Park, Ind. Over 2000 flights were made covering distances as high as 400 feet at this park. To Chanute and Herring we owe the idea of automatic stability due to other than the motions of the operator. In other words, the ailerons and elevators of the present

(Continued on page 42)

The Baby Sea-Gull

How To Build It

By ALAN D. BOOTON

HERE is a neat little model that is well adapted to restricted spaces. Although the construction looks simple, there are several details that are rather intricate for beginners.

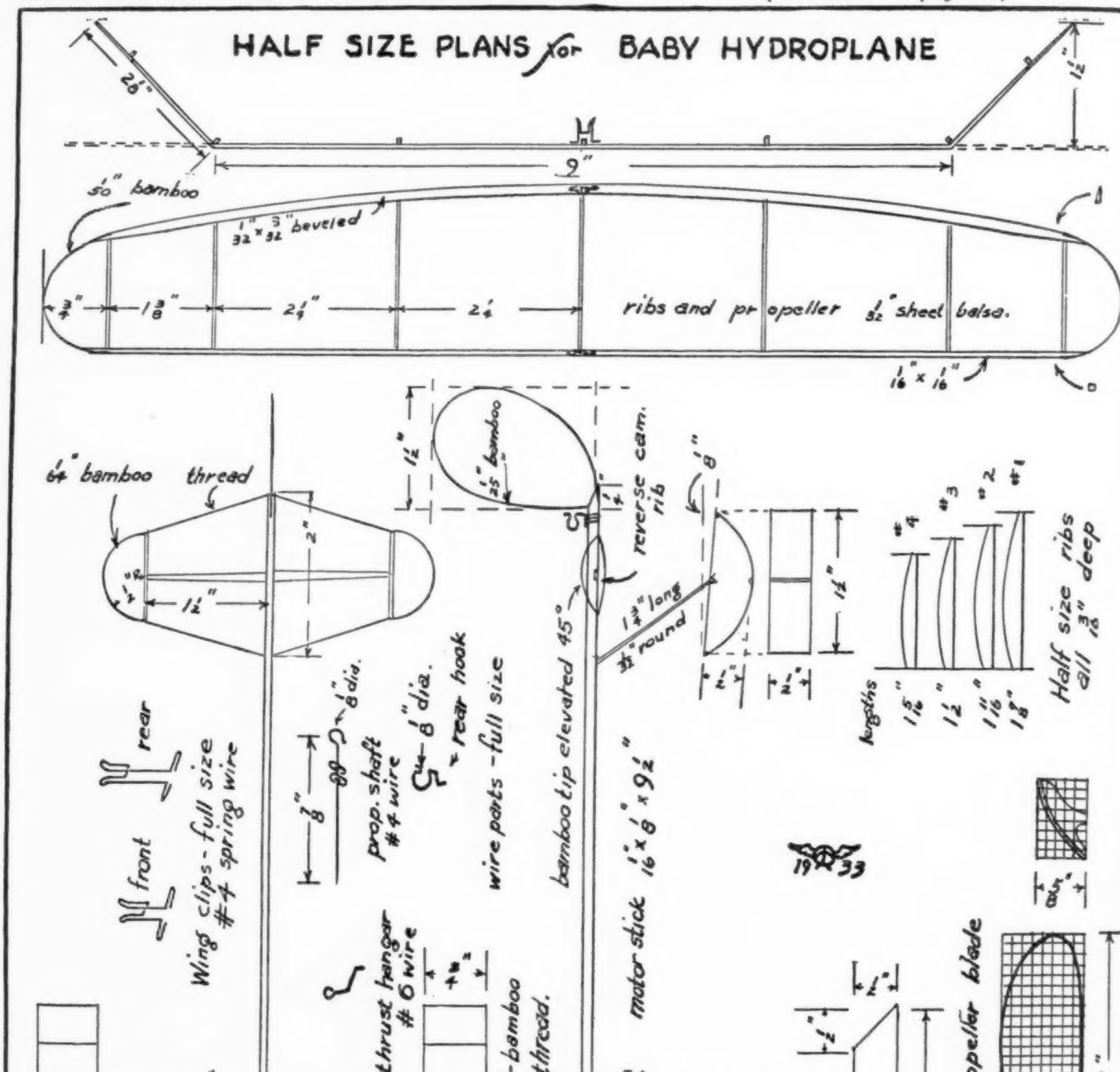
Excepting the stabilizer, propeller, and pontoons, the model is assembled like an R.O.G., so only these will be described.

The two front pontoons and the single rear pontoon are framed entirely from bamboo. The curved parts are bent in the usual manner and split fine as thread. The sides are made on a flat surface and the spacers added afterward. (Don't forget the tweezers). Cover the pontoons with superfine tissue and apply one thin coat of varnish.

The stabilizer on this ship has the two reverse camber ribs and fine bamboo tips set at a 45 degree dihedral angle.

For the benefit of those who have not bent a sheet balsa propeller, the following steps should be taken; make a whole pattern from cardboard so several 1/16" medium hard blanks can be cut out, in case one

(Continued on page 38)



The Aerodynamic Design of the Model Plane

A New Arrangement of Flight Factors that Eliminates the Danger of Stalls and How Cambered Stabilizers May Be Used To Advantage

By CHARLES HAMPSON GRANT

ARTICLE No. 18. CHAPTER No. 3

LAST month a formula was given by means of which you could calculate the stabilizer area of a monoplane. Also, it was shown that the stabilizer of a biplane could be smaller than the monoplane tail surface. In order to determine the proper amount of stabilizer area for a biplane, proceed as in the case of a monoplane, inserting in the formula, the proper values for the various symbols. Then multiply the value of (A_s) given by the formula, by (0.85). Do not multiply the (A_s) for the monoplane by (0.9) as given in the last article. This was a typographical error. The correct value for the stabilizer area of a biplane is the (A_s) of a monoplane time (0.85). Suppose we work out an example to make the problem clear to you.

We have a biplane with the following characteristics:

Wing Area, A=140 sq. inches

Moment Arm (Stab.), M =12 inches

Chord of Wing, C= 3 inches

Center of wing to nose, N=

Difference in angle between Wing and Stabilizer, Q, =1°. Distance (X) from Line of thrust to wing center section, = (1.25). In a biplane there are two wing center sections. These two sections are equivalent to a monoplane center section located at a point above the lower wing section, a distance equal to (3/5), the distance between the upper and lower wing center sections, or two-fifths of the gap down from the upper wing center section. See (H) Fig. No. 72.

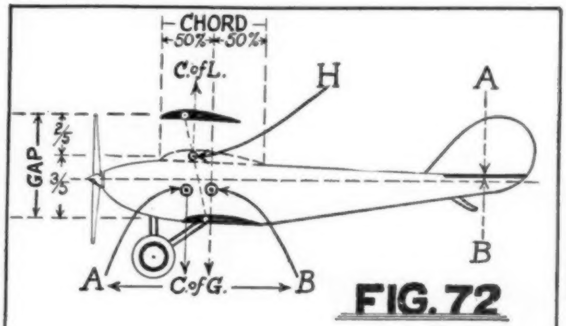


FIG. 72

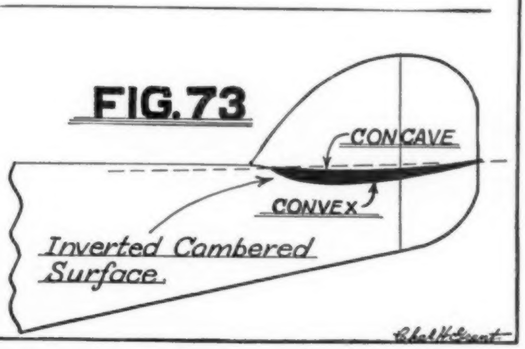


FIG. 73

In a biplane (X) equals the distance from the line of thrust to this point which is a distance of (3/5) of the gap, above the lower wing. In a triplane, this point is located above the center wing, a distance equal to ¼ of the gap between each wing. A normal amount of dihedral is assumed to be in the wings under these conditions. (This point to which we refer above, would be actually the center of pressure if the wings had no dihedral angle).

The distance from the center of gravity to this center section point is (G) which in the case of this biplane model, equals (1.75). The distance (T) from the line of thrust to the center of gravity, = (0.5).

We are to find (A_s), the required stabilizer area. Now, it is necessary to substitute these numerical values in their proper places in our formula. The formula is:

$$A_s = \frac{A}{3M} - \left(\frac{3C}{2} + N\right)$$

times

$$\left[1 - \left(\frac{Q + \frac{2X}{M} - 2}{5}\right)\right]$$

$$\text{times} \left(1 - \frac{(G + 2T)}{4C}\right)$$

Now substituting

$$A_s = \frac{140}{3(12)} \left(\frac{3 \times 3}{2} + 5\right)$$

$$\left[1 - \left(\frac{1 + \frac{2(1.25)}{12} - 2}{5}\right)\right]$$

$$\left(1 - \frac{(1.75 + 2(.5))}{4 \times 3}\right)$$

or $A_s = (3.89)\ (9.5)$

$$\left[1 - \left(-\frac{(.79)}{5}\right)\right](0.77), \text{ or}$$

$A_s = (36.96)\ (1.16)\ (0.77) = 33.05$ sq. inches. This value of $(A_s) = 33.05$ sq. inches is for a monoplane. However, as our model is a biplane, we must multiply (33.05) by (0.85); then (33.05) times (0.85)= 28.1.

Thus we see that our biplane should be equipped with a stabilizer having an area of (28.1) square inches.

IT is well to bear in mind that these formulas for stabilizer area give the *least* amount of area you should use. The more area you put in the stabilizer, the more stable your plane will be. If you wish to be assured that your plane will have sufficient stability under every condition, it is advisable in the case of all models, to increase the amount of area given by the formula, by about 20%. In other words, calculate what value (A_s) should be and then multiply it by (1.2), if you wish to be on the safe side and have an unusual amount of longitudinal stability.

Many model builders believe that large stabilizers spoil the looks of their planes and prefer to make them as small as possible and yet have planes that will perform reasonably well. If we follow the suggestion for increased stabilizer area mentioned above, the stabilizer area (A_s) of our biplane, would be: $(A_s) =$

$(28.1)\ 1.2$ or $(A_s) = 33.7$ sq. inches.

A biplane of the specifications already given and equipped with a stabilizer having (33.7) sq. inches of area, would fly with remarkable steadiness.

Many model builders are constructing triplanes so we must not overlook this class of plane. To determine the correct stabilizer area for a triplane, proceed as follows:

Solve the formula for (A_s) given for monoplanes, substituting the numerical values for the symbols of the formulas, just as we proceeded to do in our example for a biplane's stabilizer area. When a numerical value is obtained for (A_s), as $A_s = 33.05$, multiply it by (0.75). Thus, the minimum stabilizer area of our triplane should be $(33.05)\ 0.75 = 24.79$. A stabilizer with a large stabilizing effect would be: $(24.79)\ 1.2 = 29.75$. Summarizing these facts, we may say:

1. The Stabilizer Area of a *biplane* = monoplane $(A_s) \times (0.85)$ as a minimum value and as a large value, the *biplane* (A_s) = *monoplane* $(A_s) \times (0.85) \times (1.2)$.
2. The minimum *triplane* stabilizer area = monoplane $(A_s) \times (0.75)$. The large value for a triplane stabilizer area = monoplane $(A_s) \times (0.75) \times (1.2)$.

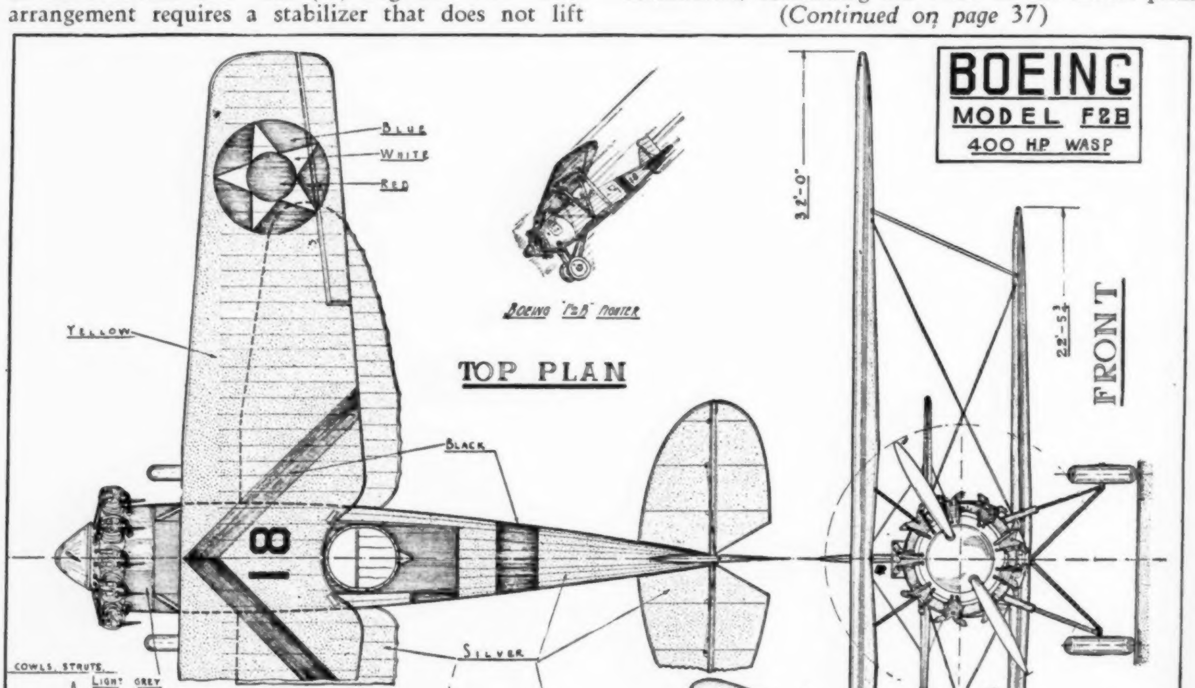
All of our previous discussion has been based on the premise that the center of gravity is located *ahead* of the center of lift. See (A) Fig. No. 72. This arrangement requires a stabilizer that does not lift but instead produces a pressure *downward* at the rear of the airplane, due to its negative angle of incidence, except in special cases where the stabilizer is "positive" because of the use of a high wing. This is the arrangement in general use on large planes (full size).

NOW, however, I wish to show you a set up of factors that has not been commonly known and which has seldom been put into practice. It has *proved* far superior in many tests made with many different flying models. Not only will it add to the longitudinal stability of your model but will reduce the stalling and diving tendencies of full size airplanes.

The basic difference of this unusual set up of aerodynamic factors is the position of the center of gravity. Instead of being located ahead of the center of lift, it is to the rear of it at most angles of attack of the wing.

Large plane designers probably have failed to adopt this system universally because of the lack of the practical demonstration of its value through experiments, by them, with model planes in actual flight. They have been prone to study models in the wind tunnel in a *fixed* position where displacing actions can be measured, but in which *reactions* of a displacement from normal flight cannot be measured. Incidentally, this latter phenomena is the most important. The ignorance of many men associated with "large plane" aeronautics, concerning the value of the model plane

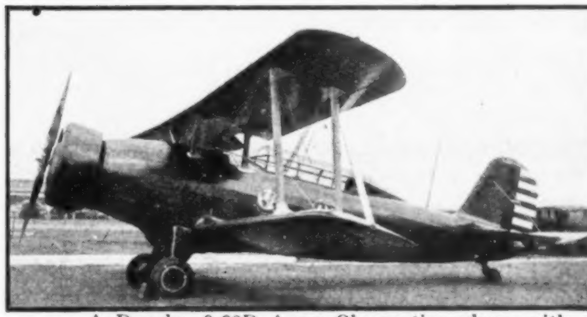
(*Continued on page 37*)



A B/J XFS-2 Navy Fighter P&W Wasp engine of 450 h.p. Speed 193 m.p.h.

A Thomas Morse 0-33 Army Observation with a 600 h.p. Conqueror engine.


A new Laird Sportster with a Wright 300 J-6 engine.


A Douglas 0-38D Army Observation plane, with Wright Cyclone of 575 h.p.

The Story Behind The I.A.A.P.E.

As told to GERALD CORD

Pictures by Fred Bamberger

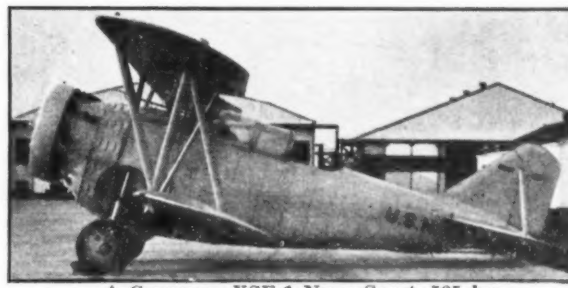
WHEN mystery surrounds a person or project of any kind, it usually creates intense interest. Such being the case, you readers should be extremely interested in this organization, the I.A.A.P.E. Even the insignia lends a mysterious and distinguished air to its members. The fact that this group got together primarily for the purpose of advancing their aeronautic knowledge and to satisfy an inborn human desire to collect things, strikes to the very heart of most readers of UNIVERSAL MODEL AIRPLANE NEWS.

The meaning of these intriguing hieroglyphics, I.A.A.P.E., translated into English is, International Amateur Aircraft Photo Exchange. It is an organization of persons interested in collecting and exchanging with fellow members, photos of all kinds of aircraft, as well as exchanging aeronautical information and data. Thus, each member has unbounded facilities for aeronautic knowledge through other members in all parts of the world, for this is a world wide fellowship.

Without doubt, you already have noticed the fine and unusual pictures on this page. They were "taken" and presented to "The News" by Fred Bamberger, one of the most active members of this society.

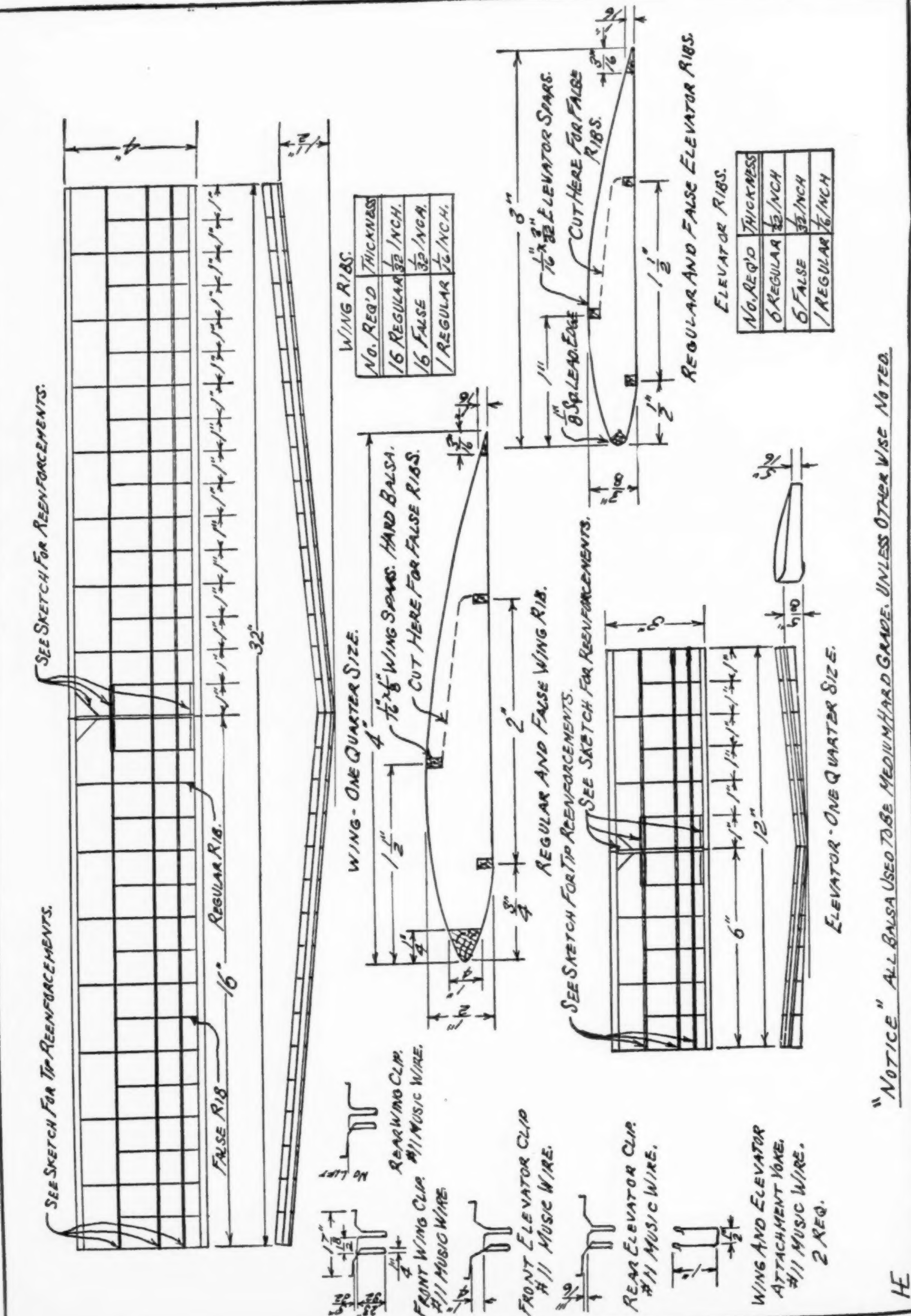
It is the aim of many of the members to obtain fine photos of new and rare ships. This often forces upon

(Continued on page 35)


A Grumman XSF-1 Navy Scout, 525 h.p. A new and little known plane.

A Vought O2U-1 Navy Corsair, P&W Wasp 425 h.p. This plane is well known.

A Douglas Army Amphibian with two P&W Wasp Jrs. of 300 h.p. each.


SEE SKETCH FOR TIP REENFORCEMENTS.
SEE SKETCH FOR REENFORCEMENTS.
FALSE RIB
REGULAR RIB.
16"
32"
WING - ONE QUARTER SIZE.
WING RIBS.
No. REQ'D | THICKNESS
16 REGULAR | 1/32 INCH.
16 FALSE | 1/32 INCH.
1 REGULAR | 1/16 INCH.
1/16" x 1/8" WING SPARS. HARD BALSA.
CUT HERE FOR FALSE RIBS.
REGULAR AND FALSE WING RIB.
FRONT WING CLIP. #11 MUSIC WIRE.
REAR WING CLIP. #11 MUSIC WIRE.
NO LIFT
FRONT ELEVATOR CLIP #11 MUSIC WIRE.
REAR ELEVATOR CLIP. #11 MUSIC WIRE.
WING AND ELEVATOR ATTACHMENT YOKE. #11 MUSIC WIRE. 2 REQ.
SEE SKETCH FOR TIP REENFORCEMENTS.
SEE SKETCH FOR REENFORCEMENTS.
6"
12"
ELEVATOR - ONE QUARTER SIZE.
1/16" x 3/32" ELEVATOR SPARS.
1/8" SQ. LEAD. EDGE
CUT HERE FOR FALSE RIBS.
REGULAR AND FALSE ELEVATOR RIBS.
ELEVATOR RIBS.
No. REQ'D | THICKNESS
6 REGULAR | 1/32 INCH
6 FALSE | 1/32 INCH
1 REGULAR | 1/16 INCH
"NOTICE" ALL BALSA USED TO BE MEDIUM HARD GRADE. UNLESS OTHER WISE NOTED.
HE

Build this Pusher that Goes Places

How You Can Build A Single Propeller Pusher That Made An Official Record Flight of 6,490 Seconds

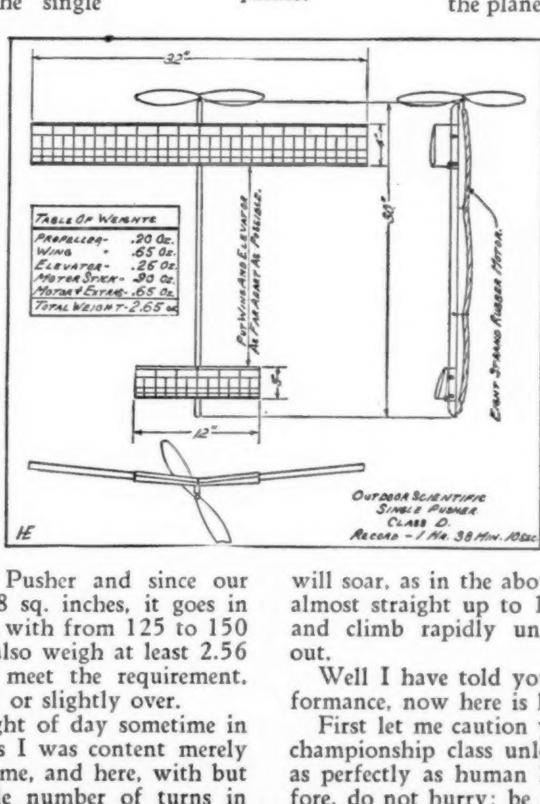
By HARRY EDSALL

SINCE the advent of weight restriction, builders have turned more and more to text books, airfoil graphs and experiment, than ever before. Since every model must have the same wing loading, it is up to the builder to incorporate every idea that he thinks will add to the ship's duration. Now weight restriction has not made planes so heavy that they will not soar. In fact the opposite is true: the models are using airfoils more similar to soaring planes. While the wing loading of a soaring plane is around 2½ lbs. to the square foot, the model has a wing loading of but 2.88 oz. to the square foot. However weight restriction has brought out the best in design, in rubber motors and all to make a winner.

This design is the product of several models, designed and built by myself, in an effort to produce as good a duration model as my seven years of experience would permit, and still have the model weigh one ounce for every fifty square inches of wing area.

The author with his record-breaking single propeller pusher.

In my effort to produce such a model I finally concentrated on the single pusher. This is, in my opinion, the best outdoor duration type. Of course the motor stick on most models is weak. However on my model it is of generous size, and so as not to be too heavy I built up the stick. This makes a stick not only unbendable but also practically unbreakable. Also in making a single pusher instead of a twin, I eliminated one motor and prop and was able to incorporate the extra weight into the model, making a much stronger structure.



We then have a model not only more efficient than the twin pusher but also much more sturdy.

This model is known as an Outdoor Scientific Single Pusher and since our model has a wing area of 128 sq. inches, it goes in Class D, this being for models with from 125 to 150 sq. inches. The model must also weigh at least 2.56 oz. This model will easily meet the requirement. The original weighed 2.65 oz. or slightly over.

This model first saw the light of day sometime in May 1932. For several weeks I was content merely to test it in a field near my home, and here, with but little over a third the possible number of turns in the motor, I was able to get five minutes with the model. I then saw I had a model that should be able to break the then existing world's record of 340 sec. held by Steve Klazura of Chicago. I did not realize however, that I was to break it by such a large margin.

It was not until June 17, 1932 that I was able to wind the model to capacity. This was during the annual contest for outdoor scientific single pushers held at the local airport, under the sponsorship of the Y.M.C.A.

AFTER several test flights, I wound the motor to capacity, about 1250 turns, and let her go. By the time the prop had stopped turning, the model was a mere speck and had to be kept in sight with binoculars. It then was almost to the clouds and it did not take long to get up to them, and there she was riding the clouds as easily as if Kronfeld himself were at the controls.

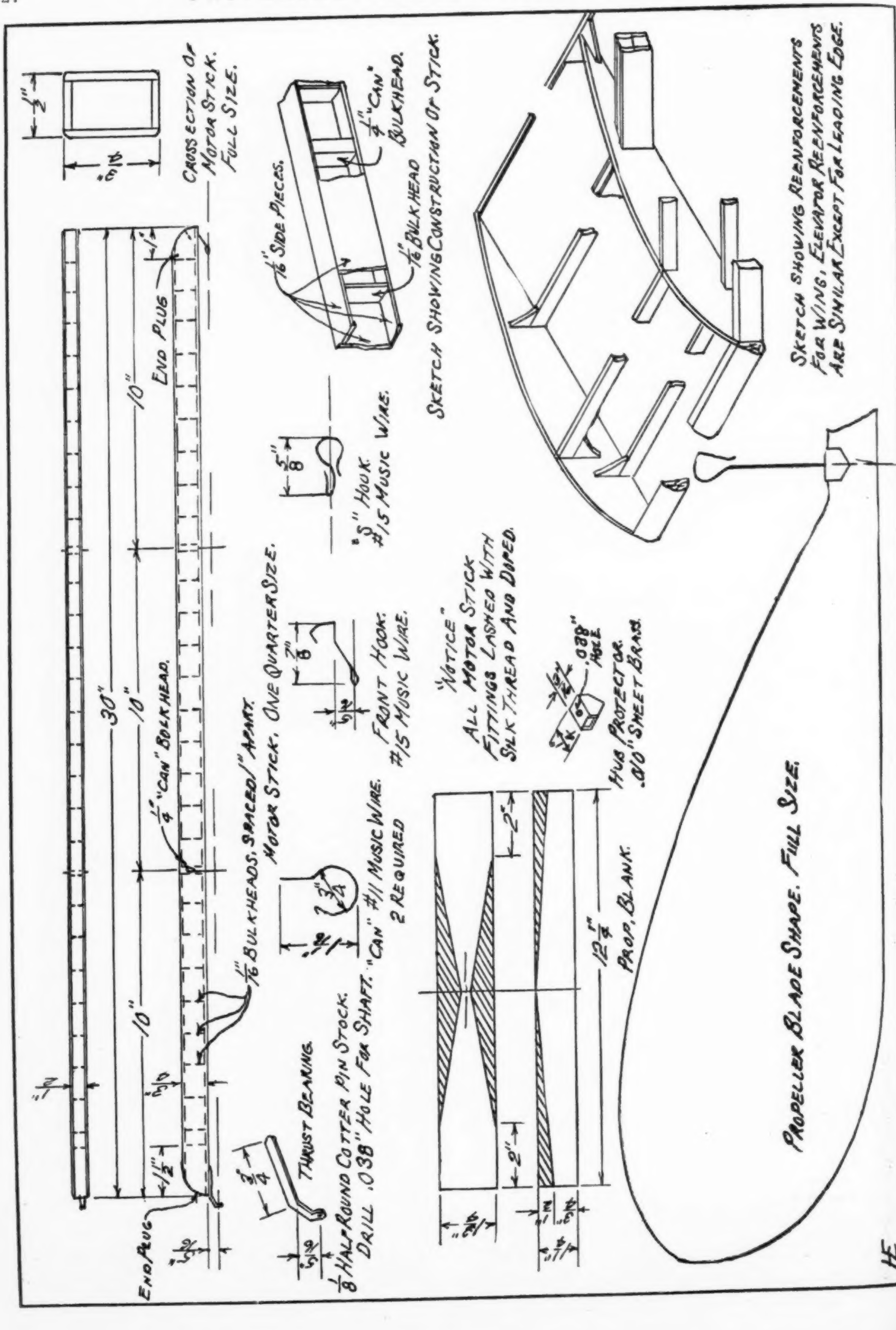
The plane drifted slowly with the cloud. However, we on the ground were not having an easy time of it. After the first half hour, necks were stiff and everyone was in danger of losing his life as the cars that were following the plane were filled to overflowing with the model enthusiasts. Then, after what seemed hours, a small piece of cloud passed between the timers and the plane and the flight was officially over. The model in that time had flown over eight miles, the correct distance not being taken as the N.A.A. recognizes only records for duration. The three stop watches gave an average time of 1 hour, 38 minutes and 10 seconds. (6,490 sec.) Truly remarkable time for any model. For most of the flight the model had held an altitude of over 1500 feet.

The model gains its time through an extraordinarily good climb and a flat glide and under good conditions will soar, as in the above case. It will, at first, climb almost straight up to 100 or 150 feet then level out and climb rapidly until the motor is almost run out.

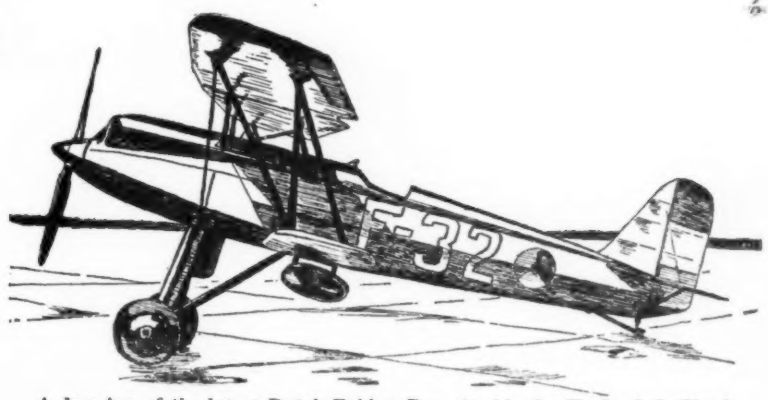
Well I have told you about the plane and its performance, now here is how to build it.

First let me caution you. No model will be in the championship class unless it is made as carefully and as perfectly as human hands can fashion it. Therefore, do not hurry; be sure everything is all right before you cement; give the parts plenty of time to dry

(*Continued on page 41*)


CROSS SECTION OF MOTOR STICK. FULL SIZE.
END PLUG
30"
10"
10"
10"
1/4" "CAN" BULKHEAD.
1/16" BULKHEADS, SPACED 1" APART.
MOTOR STICK. ONE QUARTER SIZE.
THRUST BEARING.
1/8" HALF ROUND COTTER PIN STOCK.
DRILL .038" HOLE FOR SHAFT.
"CAN" #11 MUSIC WIRE.
2 REQUIRED
FRONT HOOK.
#15 MUSIC WIRE.
"S" HOOK.
#15 MUSIC WIRE.
1/16" SIDE PIECES.
1/4" "CAN" BULKHEAD.
1/16" BULKHEAD
SKETCH SHOWING CONSTRUCTION OF STICK.
"NOTICE"
ALL MOTOR STICK FITTINGS LASHED WITH SILK THREAD AND DOPED.
HUB PROTECTOR.
.010" SHEET BRASS.
.038" HOLE
12 1/4"
2"
2"
PROP. BLANK.
PROPELLER BLADE SHAPE. FULL SIZE.
SKETCH SHOWING REENFORCEMENTS FOR WING. ELEVATOR REENFORCEMENTS ARE SIMILAR EXCEPT FOR LEADING EDGE.
HE

AIR WAYS
HERE AND THERE


A drawing of the latest Dutch Fokker Pursuit ship, by Harland C. Wood.

What Our Readers Are Doing to Increase their Knowledge of Aviation. Get Busy and "Air Your Ways" of Building and Flying Model Planes

THOUGH many of our model builders have been busy night and day building machines to enter in the National Contest, during the past month or two, our old friends have not neglected to supply us with interesting material for our Air Ways column.

In looking over the various letters which have come to me from different parts of the world, I find that many of our contributors are sending in pictures which it is impossible for us to reproduce properly in the magazine. Without question it is a difficult task to obtain good photographs of models in flight. However, with a little study, it is possible to overcome the difficulties involved. Most amateurs take good pictures of "still" objects. However, they fail to realize that in taking pictures of models, it is necessary that the models be fairly close to the camera in order to make them of reasonable size. This means usually that the focus of the camera must be changed.


Pict. No. 20. A Boeing P-12 B, beautifully built in detail by Joseph Seidenwand, our finest model this month.


Pict. No. 4. One of the best flying scale models we have seen, by Edward Kovac.


Pict. No. 9. One of Elbert Weather's fine gliders on its way up.


Pict. No. 6. Just a model Lockheed Orion on wires, beautifully built by Sam Smithers.

Our contributors will save themselves a great deal of trouble and will have better results if they will use care and thought in this matter.

Those young men who make free-hand drawings of ships do not have this difficulty. One of our excellent and regular contributors of this type of copy is Harland C. Wood of Lyndonville Vermont. At the head of our Air Ways column you will see one of his pictures, (No. 1), a Fokker D-17, one of the latest Dutch pursuit ships. It is exceedingly well done. Wood has improved greatly in his art work in the last few months, it seems to me.

BOEING models seem to be very popular for Joseph Seidenwand of 2361


Pict. No. 3. Jack Skocir built this German Rumpler.

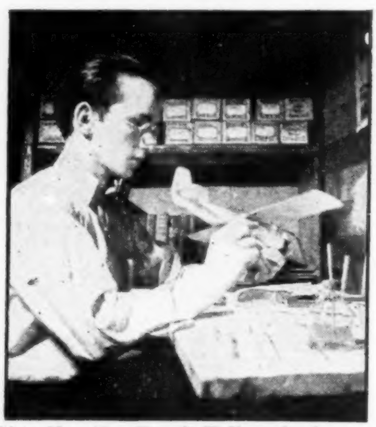

Pict. No. 7. A C.C. Sportster by John B. Hastings.

Pict. No. 5. A flight of cardboard Boeing P-12s built by Russell Park, a clever piece of photography.

East 82nd Street, Cleveland, Ohio, sent us picture No. 2 of his Boeing P-12 B . This model is made in detail. With the exception of the tail surfaces it is entirely "built-up." The fuselage has a metal framework, the framework of the wings being made of wood. Seidenwand has done a nice job on the metal cowlings of the nose and cockpit. The ship is covered with silk and finished with Berryloid dope. Seidenwand has outdone himself in the detail of his model for the engine is equipped with a model carburetor and twin magnetos which can be inspected through a removable cowling. Other details include movable controls operating from the cockpit and two fixed Browning machine guns. The span is 24 inches. This young man suggests very naively at the bottom of his letter that this is not a flying model. If such a model could fly with all this detail embodied in its make-up, Seidenwand would be in line for a Congressional Medal of honor.

Pict. No. 8. A Howard "Ike" by Glen E. Courtwright. Looks like a grasshopper but flies better than one. Very neat.

Bob Schmidling of 3019a North 25th Street, Milwaukee, Wisc., takes the time to boost the work of one of his friends, Jake Skocir who constructed the plane shown in picture No. 3. It is a German Rumpler as you will see. Schmidling sent in pictures of some of his own machines but we only have room to show one and therefore selected the Rumpler because it was the best photograph.



Pict. No. 10. Frank Yellen rigging up a model in his workshop for a contest soon to take place. He is a real model enthusiast.

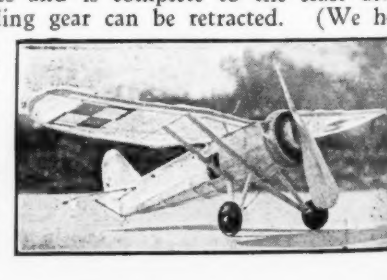
Many of our contributors have succeeded in instilling flying qualities into their scale models. Edward Kovac of 72 Elmwood Avenue, Bridgeport, Conn., favors us with picture No. 4 of his Travel Air biplane. Kovac tells us that this model has made some very excellent flights but although he has tried to take pictures of it in flight, he has been unsuccessful so far. Great ingenuity has been shown by many readers concerning the manner in which they pose their models.

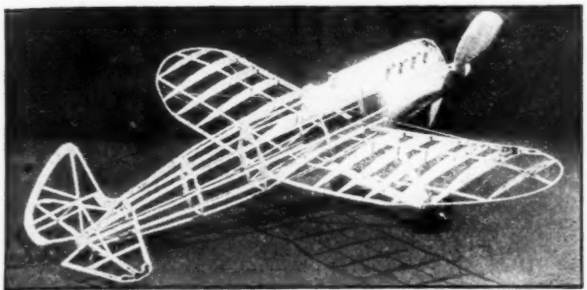
Russell L. Park of 1670 Stillwater Avenue, St. Paul, Minn., has sent us picture No. 3 showing a flight of Boeing P-12s. The ships are all made of cardboard but look very realistic. Unquestionably it has taken a great deal of patience to suspend and arrange these ships to give the effect of natural flight. If you will look closely, you can see clouds in the background, which adds to the illusion. Park tells us of an interesting incident in his letter. He says, "I dropped two P-12s from a kite about one hundred feet in the air and they 'spun in' making a perfect crack up both times." This is certainly a very effective way of getting rid of old junk models. Of course we do not mean to infer that these models were junk models but are merely making a suggestion to some of our readers.

WE HAVE just received a letter telling us of a very efficient partnership between two gentlemen of the aeronautical world, who give their address as 1000 East Jefferson Street, Fort Worth, Texas. Mr. Ward Essner who writes us the letter, acts as the official photographer for Mr. Sam Smithers who builds the models. They make a very excellent combination. In picture No. 6 is shown a Lockheed Orion apparently in flight, a product of this partnership. One could readily mistake the picture of this model for one of an actual full size plane. This is quite a remarkable machine. It has a span of 20½ inches and is complete to the least detail. Even the landing gear can be retracted. (We hope

Pict. No. 12. An excellent job of a J.N.4 trainer by Peter Anzalone.

Pict. No. 16. A Polish P-6 by Harry Trimble, only one of many others.



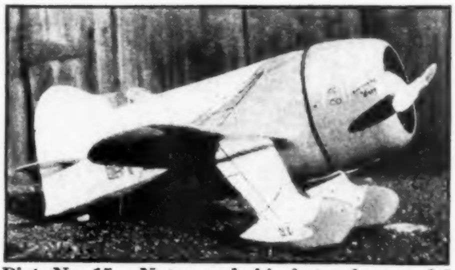


Pict. No. 13. A Howard Racer by Raymond Nelson, almost finished.

Pict. No. 17. Some model builders of Pittsburg, Kansas.

that these gentlemen do not retract anything else.) This is done by pulling on a lever. The plane has workable controls and believe it or not, a compass in the cockpit that actually gives the correct bearing. The prop was hammered from a piece of aluminum rod. Even the tail wheel has a shock strut. This plane was entered in the 1932 Dallas Fair and carried off second prize.

Picture No. 7 shows a very remarkable machine built by John B. Hastings of 311 North 8th Street, St. Joseph, Mo. This is not only a trim-looking craft, similar to a large ship but is one of the best of flyers. It is a C. C. Sportster. On one flight this plane reached an altitude of 250 feet and covered a distance of nearly half a mile. The time was 45 seconds. It is equipped with an automatic parachute release. Hastings sent us a picture of the machine in flight but the ship in the air was so small because of the great distance, that it was necessary to look at it through a magnifying glass. It would have been useless to attempt to reproduce it in the magazine.



Pict. No. 15. Not a real ship but only a model of Gee Bee by Robert McKee. It is built in detail.

Glen E. Courtwright of 1010 Kankakee Street, Lincoln, Illinois, sends us picture No. 8 of what we at first thought was a huge grasshopper. The reader can readily understand where we made our mistake if he will note the head of the creature, which shows the eyes, mouth and antenna which is the propeller, can be clearly seen. Actually this is a very fine flying model of a Howard "Ike." It has a wing span of 15½ inches and weighs completed one-half ounce, nineteen grains. Three single strands of ⅛" single rubber supply the necessary power. Courtwright says he would like to exchange these plans with other readers for plans of ships which he might want.

Pict. No. 14. William Meitzler's Pathfinder in full flight. A well-posed actual flight picture.

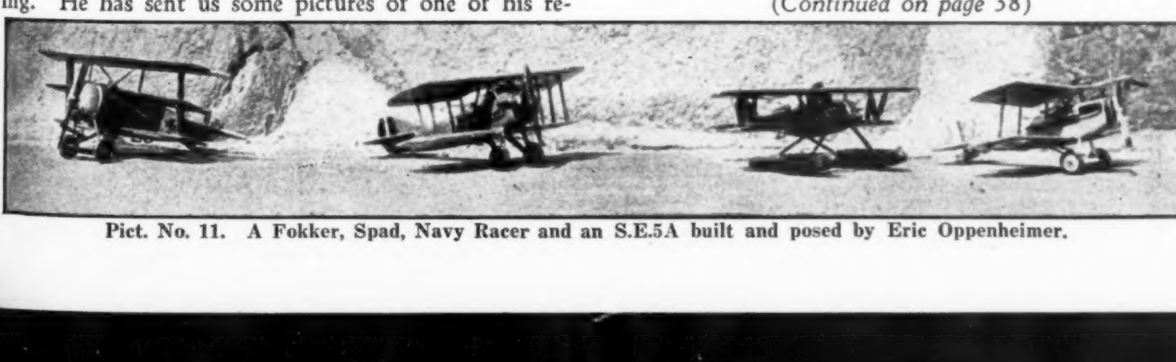
ELBERT J. WEATHERS, 2720 Poinsettia Drive San Diego, Calif., has taken up model glider flying. He has sent us some pictures of one of his recent creations. As we can only use one picture we feel that the most interesting one would be the one with the glider in flight, picture No. 9. This machine has attained great heights on several occasions. The wing span is 5 feet and the duration of the longest flight is nearly 4 minutes.

One of our enthusiastic readers favors us with a picture of himself while at work in his workshop, on one of his numerous planes, picture No. 10. The plane which Frank Yellen of 130-21 95th Avenue, Richmond Hill, N. Y., is holding is a racing plane of his own design. We have been wondering if it is possible that Yellen derives his genius from his diet. Possibly we have discovered a secret but if you will carefully note you will see on the shelf many empty cheese boxes. Unquestionably food of this type is very nourishing. We appreciate greatly that he has let us have an intimate view of his model activities.

Eric Oppenheimer, 44 Chittenden Avenue, Crestwood, N. Y., has made an excellent job of four 6 inch models shown in picture No. 11. They are from left to right, a Fokker triplane, a French Spad, an American Navy Racer and a British S.E.5A. Considering the small size of these ships, Oppenheimer has made a very fine job of them. We are grateful for his contribution.

Next, we have what I would call a work of art. It is a photograph of a J.N.4, picture No. 12, the greatest training plane of the World War. This model was built by Peter Anzalone of 6119 Chestnut Street, Philadelphia, Pa. Readers who have built models of this ship realize that it is a very difficult job. Instead of internal bracing, these old ships were designed with many external truss wires. These made it extremely difficult to rig the ship properly so that it had the appearance of an airplane rather than an iron fence after an earthquake. Anzalone has gone so far as

(*Continued on page* 38)



Pict. No. 11. A Fokker, Spad, Navy Racer and an S.E.5A built and posed by Eric Oppenheimer.

Airplane Maneuver Contest

What Maneuver is Being Executed by the Plane on the Cover?

—Winner of May Contest—

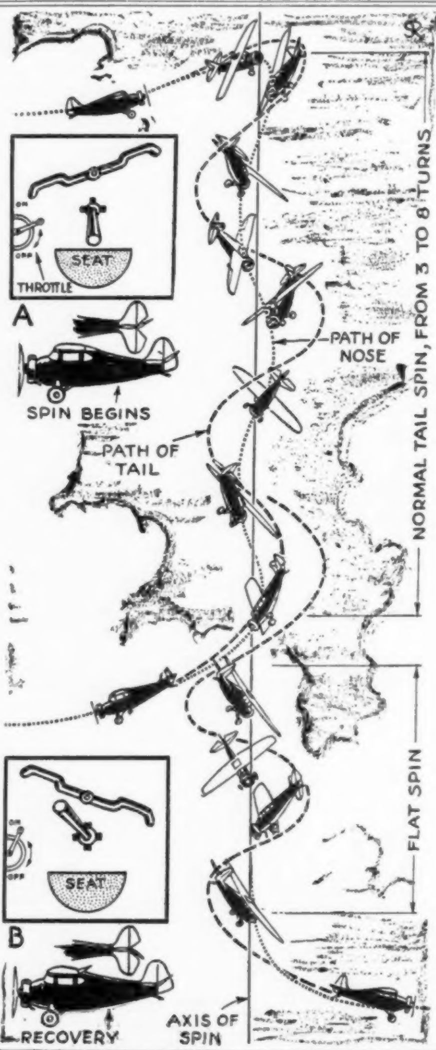
Do you wish to become a pilot? If you do, you will want to know how and why a plane is made to perform the maneuver pictured on the cover. Enter this contest and learn the basic principles of flight. The winner of each monthly contest will receive, as a prize, the beautifully colored, original painting of the cover picture. $100.00 in prizes given to winners of the contest of six monthly cover pictures, February to August.

HERE we are with the sixth and final Maneuver Contest Pictures. What a time some of you industrious readers have had pouring over books and papers seeking material to send in as your answers to the five maneuvers we have presented already. A happy reader has received a picture for his award each month. Now when all six series of answers are in, we will choose the winners who have sent in the six best answers to all of the pictures. Those of you who have sent in answers before, do your very best on this last test of your knowledge. This one answer may turn the tide of decision in your favor. Remember, there are nineteen prizes to be given besides the cover pictures.

The May Contest Winner

On the cover of our May issue was a picture entitled "The Wedell-Williams Finds A Hole." Our aeronautic friends outdid themselves in telling us about this maneuver. Most of the answers we received, diagnosed the maneuver correctly but very little care was used in many cases regarding the manner of presenting the answer. Also, only a few gave correct, detailed information about the maneuver. This was very important.

However, one young man sent us his answer presented in a manner that was perfect in every respect. We cannot see whereupon it can be improved and wish to compliment him on a remarkable piece of work. We are only sorry that it is impossible to let all of our readers see this work of art. In fact, it is the finest piece of work that we have received in all the four months that the contest has been running.



It is with the greatest of pleasure that we announce the winner to be David H. Setzer, P. O. Box 1462, Lakeland, Florida. The picture will probably hang on his "wall" by the time you read this.

Those who sent in excellent answers and who placed close to first place, are as follows:

Roger F. Parkhill, Minneapolis, Minn.
Philip Chandler, Nashville, Tenn.
Ogden Whitney, Bronx, N. Y.
Arnold Gregerson, Mason City, Iowa.
Albert R. Cline, Derry, Pa.
L. H. Tarbox, Flushing, L. I.
Raymond Rampson, Dubuque, Iowa.
James W. Wooding, Brookline, Mass.
Ike L. Kibbe, Austin, Texas.
Cedric E. Galloway, Austin, Minn.
William Drake, Malden, Mass.
John Alfirevic, Chicago, Ill.
W. O. Watkins, Tucson, Arizona.
Dick Zurlinden, Lakewood, Ohio.
Kenneth Harber, Rochester, New York.
Percy Gilbert, Jr., Roselle Park, N. J.
Jean S. Chadwick, Syracuse, New York.
Manley Mills, Royston, Ga.
E. Ronald Schuver, Minneapolis, Minn.

Answer to the June Maneuver

CONTRARY to popular belief, the tail spin is not un-
(*Continued on page* 48)

Here is How You Win the Awards

EXAMINE the cover picture carefully and determine what maneuver the plane is executing. This can be done by noting the position and attitude of the plane and the setting of the ailerons, rudder and elevators. When you think you can give the correct answer, write us, naming the maneuver and how it is performed. Also give your name and address, printed or typewritten. The last maneuver in this contest will appear on the cover of the August UNIVERSAL MODEL AIRPLANE NEWS.

Winners will be chosen on the basis of accuracy, neatness and the amount of detailed information given about each maneuver. The awards will be as follows:

Winner of 1st place, $25.00; 2nd place, $15.00; 3rd place, $10.00; 4th to 7th places, inclusive, $5.00; 8th to 11th places, inclusive, $2.50.

All answers to any particular pictures must reach this office by the 20th of the current month.

The correct answer for any particular cover will appear in the following issue of this magazine, with diagrams explaining the maneuver.

Send answers to **Maneuver Contest, UNIVERSAL MODEL AIRPLANE NEWS, 125 West 45th Street, New York City.**

Model builders who gathered to compete for trophies in the recent Angus & Coote Cup Contest, Australia.

Model News From Other Countries

Events Showing How Other Model Builders Are Progressing In The Art Of Model Aeronautics

OUR Australian brothers have been very active in the past few months. Mr. Freshman has kindly sent us pictures showing views of recent contests. You will notice that we refer to our Australian friends as brothers. This fact we wish to emphasize for in Mr. Freshman's recent letter, he objected strongly to our use of the term "foreign activities." He and Australian model builders do not wish to be considered foreigners in respect to model activities. I must certainly apologize for any reference which is objectionable to these active model enthusiasts. Possibly Mr. Freshman failed to realize that I was speaking from a terrestrial standpoint only. It is also possible that he failed to note that we referred to them as brother model builders. We are wondering what closer relationship we could have. However, we are not taking this too seriously.

Pict. No. 1. A few contestants in the Percy Marks Trophy Contest.

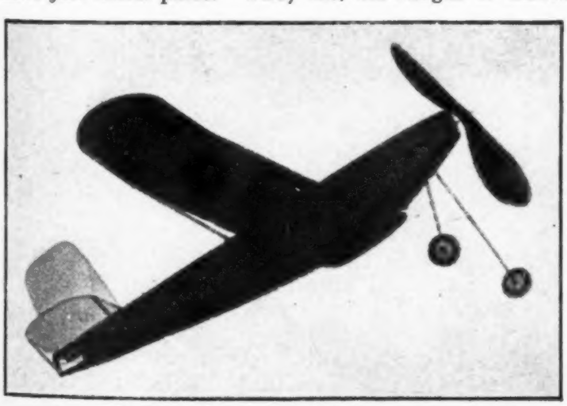
Two of the biggest events of the year in Australia have just taken place. They are, the Angus & Coote Cup Contest open to all types, hand launched, and the contest for the Percy Marks Trophy, which is for fuselage models.

The picture at the head of the page shows the group of model contestants who assembled to compete for the prizes. It is obvious that model building and flying is very popular in the Southern Hemisphere.

Picture No. 1 shows a group of young men who competed for one of the trophies. The young man in the foreground is holding a model of the Morane Saulnier which he built from plans in this magazine. He has made a very excellent looking job of this ship and we wonder if it flies as well as it looks.

Picture No. 2 shows J. Leighton's fuselage model which flew for 16 min. 22 sec. Those of you who read the Australian news each month in our magazine know that this time is in keeping with other performances made by Australian model builders.

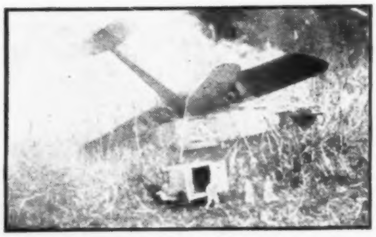
To show the extent of the interest in model plane



An outdoor fuselage model built by J. Leighton, which recently flew for 16 min. 22 sec.

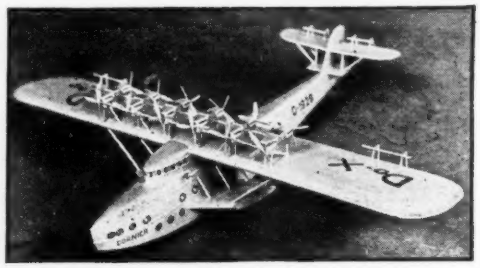
Pict. No. 4. Not a swarm of insects, just a few models.

building in this far off country, we wish to call your attention to picture No. 3. This shows Dr. E. H. Smalpage and his family, all of whom are interested in this fine sport. One might say that they have started from the ground up. The model which the Doctor is holding was built by him and flies exceedingly well in any kind of weather. He de-



Pict. No. 6. Photo from a model in flight showing a model on the ground ready to take off. (Don't ask, "take off what?")

Pict. No. 5. A Transport (model) crashes in Lilliput. Ambulance and doctors arrive promptly to render first aid.



Pict. No. 7. A model DO-X built by Cliff. G. Andrews of Otago, New Zealand. It is a fine job.

Pict. No. 3. Dr. Smalpage and his air-minded family.

signed it especially for an all-weather flier.

We have often heard of swarms of locusts but it seems that in Australia they are afflicted with a different species of winged creature, as you can see from picture No. 4. It shows literally a swarm of airplanes, which was the feature of the contest. I should venture to say that nearly every possible type of plane is depicted here.

New Zealand

MR. FRESHMAN has also favored us with some pictures of an original and interesting pastime practiced by the Balclutha Bellbirds of Otago, New

(*Continued on page* 38)

How to Establish Record Flights

WE FREQUENTLY receive letters from our readers who write regarding model plane records. Many of our correspondents assert that they have established new records or know of a new record that has just been made.

We have inquired into the status of some of these records and have discovered that many cannot be officially recognized due to the conditions under which the flights were made. It appears that there are records and records, many of which are undoubtedly genuine. But a record is meaningless if it has not been established under certain specified conditions and unless it is recognized by the proper governing organization.

In this country the recognized organization qualified to authenticate flight records is the National Aeronautic Association. Last month we published the N.A.A. Model Airplane Definitions and Competition Rules and the categories in which records are officially recognized. Next month we will publish a list of the American model plane records that have been officially recognized by the N.A.A., up to the end of June, 1933.

We have asked the National Aeronautic Association to outline the necessary procedure. It proves to be quite easy to secure the acceptance of a record. The N.A.A. requires that all records to be eligible for recognition must be made in sanctioned meets or under specific direction of the Contest Committee of the N.A.A. We quote the Association's sanction requirements:

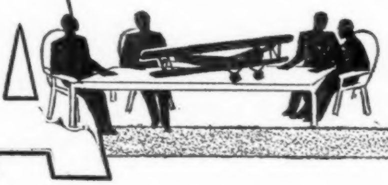
"The National Aeronautic Association will sanction model plane meets that are conducted by a recognized N.A.A. Contest Director according to the rules of the Association, and which are sponsored by a reliable organization or individual who gives ample assurance that advertised prizes will actually be awarded. N.A.A. sanction is a prerequisite to recognition and acceptance of record flights.

"Glad to assist any group wishing to conduct a meet on a sound basis, the Association recognizes the importance of protecting sponsors as well as contestants from the possibility of conflicting dates. Coordination of model activities to the end that one meet will aid and abet rather than conflict with and injure another is essential. It is to avoid destructive conflict and to guarantee a high standard for all meets that sanction is required. Every effort will be made to see that any meet conducted on a sound basis receives sanction. The Association undertakes through supervision of recognized Contest Directors to insure that record flights are performed under conditions giving equal opportunity, and that unbiased, qualified persons serve as officials. Experience proves that loosely managed meets undermine the success of contest flying.

"IT IS not difficult to obtain sanction. Application forms are furnished to anyone interested. Fees are reasonable and on a sliding scale according to the class of the meet. Before sanctioning any model plane meet, the Association requires that the application form be executed and forwarded to the Contest Committee for consideration, and that in the case of an unknown or unrated sponsor, some responsible

(*Continued on page* 44)

Aviation Advisory Board



Conducted by
CHARLES HAMPSON GRANT
Chairman of the Board
Formerly of
The Technical Section, Air Service, U. S. Army

HERE I am again sitting in front of my desk with a pile of questions from our readers. I have looked through them in dismay and find that I will have to answer most of the questions by letter. You know we are limited to a definite number of questions in our Advisory Board. However, here are a few that I believe will be quite interesting.

Joe Fulton of Oconto, Wisconsin, asks the following:

Question: Is there any advantage in placing a tail plane just in front of the propellers of a twin pusher?

Answer: There is absolutely no advantage in doing this although it is the custom which has been followed by many builders. If the machine is properly designed in the first place, proper stability will be had without the use of this tail plane. Unquestionably it causes considerable drag and gives practically no lift. I should say that the addition of a tail plane such as is mentioned here, is an admission on the part of the builder that he was unable to design the rest of the plane to function properly. If the front elevator and main wing are designed correctly with the proper angle of attack and dihedral relative to one another, perfect stability can be obtained. For a good twin pusher which will operate perfectly without the use of the tail plane, see page 23 of the June issue of UNIVERSAL MODEL AIRPLANE NEWS.

Here is one, Joseph Zink of 71-61 70th Street, Glendale, L. I. He asks a question which has not appeared before.

Question: Can you tell me how a machine gun can fire through a propeller without the bullets striking the propeller blades?

Answer: A machine gun is so synchronized or timed with the propeller as it revolves, that the gun is prevented from firing at any instant during which the propeller blade passes in front of it. The pilot pulls the trigger and the gun keeps firing until the blade comes into the line of fire. There is a mechanism on the propeller which then operates the gun and prevents it from firing at this instant. This device is so finely calculated that the velocity of the bullet and the time it takes to get from the muzzle to the propeller is allowed for. We hope that this will answer your question.

HERE is a young man who is bashful for he requests us not to mention his name in connection with his questions. We will comply with his request but feel that his bashfulness is misplaced.

Question: How do you find the area of a double surfaced straight wing?

Answer: The area is equal to the span, tip to tip, times the depth or chord of the wing. Deduction should be made for rounded tips. The area of cut away corners should be divided into triangles, the areas of which are calculated by multiplying one-half the base times the altitude of each triangle. The whole area of the cut away portion should be subtracted from the total area given by multiplying the span times the chord.

Question: How do you find the area of a double surfaced tapered wing?

Answer: First find the average chord by adding all the chord lengths of the wing from the center to the tips. These chord lengths being taken at regular intervals along the wing. Then divide by the number of chord lengths. This will give the average length. Then multiply this average length by the span of the wing. Whether your wing is double surfaced or single surfaced makes no difference. The area of any WING is its projected area. The area of its SURFACES would be the sum of the top surface plus the bottom surface.

Advise me on the following concerning a lightweight speed plane model of 20 inch span.

(a) The length of fuselage?

(*Continued on page* 32)

Here is one of the Army's latest "Fighters," the Berliner-Joyce P-16, powered with a 600 h.p. Curtiss "Conqueror" engine. The whole construction is of metal, fabric-covered. It makes a speed of 176 miles per hour and climbs 2,200 feet per minute.

Aviation Advisory Board

(*Continued from page* 31)

Answer: The length of the fuselage should be longer in the case of a speed plane in order that it may hold a straight course. I would advise using a length of 20 inches.

(b) A high or low pitched propeller, also diameter of propeller?

Answer: A medium pitch should be used, approximately 1½ times the diameter. I should advise using a diameter of 7 inches and a pitch of 10 inches.

(c) A high or low wing type in regard to stability?

Answer: On a speed plane the wing should be approximately on the line of resistance, taken in a horizontal plane. This would probably be slightly above the line of thrust. The resulting type of plane would be termed a "mid-wing."

(d) Would you have plenty of dihedral?

Answer: I would advise a dihedral of ¾ of an inch to one inch on each wing tip for every foot of span.

(e) What precautions would you have to take to have it fly in a straight line?

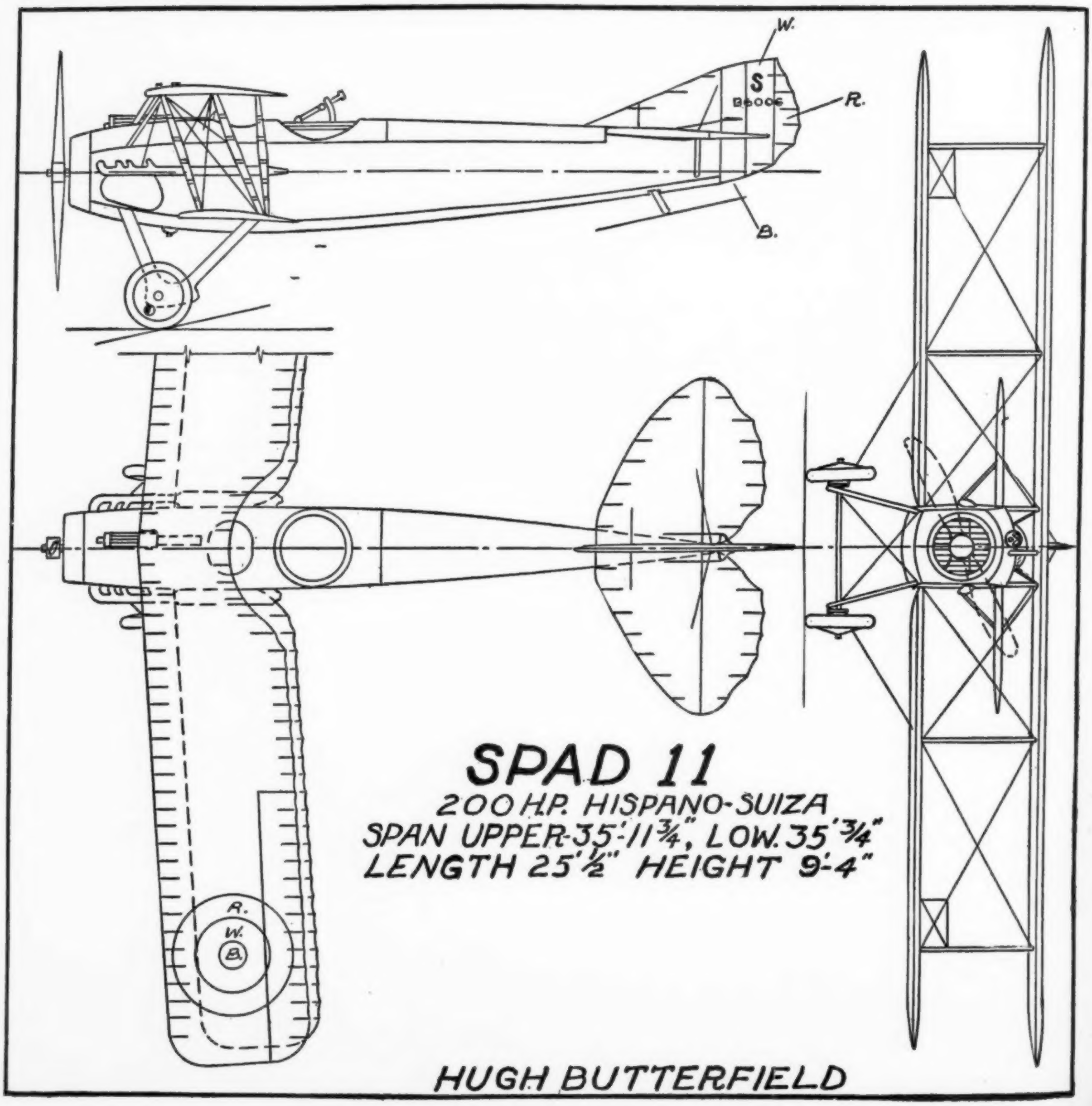
Answer: A long fuselage will help it to fly a straight course. Also make the fin fairly large, that is from 12 to 15% of the wing area.

Bob Clark of 91 East Belvidere Street, St. Paul, Minn., is all steamed up over the advisability of using gull wings. He wishes to know:

Question: What are the aerodynamic principles involved and what types of plane are they best suited for?

Answer: Gull wings are not designed as gull wings because of any advantage from an aerodynamic standpoint except insomuch as they reduce parasite resistance at the center section. In other words, by slanting the wings downward into the body at the center section instead of having it pass directly across above the body, the resistance of the struts necessary for a high wing type have been reduced, for in the gull wing, there are no struts, the wing itself acting as the bracing members.

The wing immediately above the body is eliminated in the gull wing type and less interference is caused by the close proximity of the body to the wing as occurs in parasol types. In other words, the gull wings will lift approximately the same amount as parasol wings, yet the resistance has been cut down considerably by the reduction of unnecessary structure. There is another distinct advantage in building the wings this way. The pilot has greater visibility. This can be readily seen, for the wing is not in his line of sight and in the case of warcraft, it does not obstruct his vision of the enemy. Also he can see the ground readily as the trailing edges of the wings slant forward or are cut away near the body. The tapered, rounded tips of the gull wings give greater efficiency because less air is spilled out of the ends of the wings than would be the case if square ends were used. On the whole, a wing of this type offers less resistance than the ordinary type of wing and better visibility.



Night Flying from Carrier Decks

A Navy Boeing F4B-3 "takes off" a carrier. Note wireless mast.

ONE of the most interesting jobs done by Navy fliers is the landing and taking-off from carrier decks at night. To get some idea of the problem confronting the pilot, put yourself in his place for a moment, you are two thousand feet above a vast expanse of sea. There is no light visible anywhere except the weird glow from the little red, green and white navigation lights on your wing-tips and rudder post. Somewhere down there in that black void below you is a hundred-yard deck. Upon this rolling and pitching platform you must bring your plane down at seventy miles an hour and at the same time avoid the others which have already landed. It is a ticklish job.

Directing the operation is a man who stands upon the deck, holding an electric light in each hand. Manipulating these lights as an orchestra leader wields his baton, the signalman is able to inform the coming pilot of his position during the approach and when it is time to settle down for the landing.

To get a plane back aboard its mother ship, the carrier heads into the wind so that the plane can land in the shortest possible space. The deck is outlined by a row of lights and the pilot picks these out as he comes in. As he crosses the edge of the deck, however, his lower wing blots out the lights from his view and he must depend upon the signalman.

If everything is all right, the two lights are held horizontal and the pilot continues his approach. Soon he is down over the teakwood surface of the deck. It is time to kill the engine. Quickly, the signalman moves one light from right to left and the other downward sharply. The pilot cuts his motor and pulls the stick back and waits for the slight jolt that will tell him he has made contact with the deck. If the signalman has estimated properly, the landing will be smoothly done.

Giant Tires

IF you saw a tire twelve feet in diameter and four feet wide, you would wonder perhaps whether or not you were dreaming. But you wouldn't be—it's only the giant tire made by the Goodyear Rubber Co. of Akron, Ohio, makers of the Dirigible Macon, as an advertisement for their new tires.

This big tire weighs 3900 pounds and takes forty-five minutes to fill it full of air to only three pounds. This sort of tire does not take the high pressure that even the modern balloon tires require. Most cars require from thirty to forty pounds pressure in the tires. These large doughnut-like tires only require up to about ten pounds pressure and this enormous demonstration tire only takes three pounds. Of course, that is because it carries no weight except its own. It cost $5000 to build this tire and the inner tube weighs 125 pounds alone. For the price it took to build this tire, one could buy 1000 tires for a Ford.

Because this tire is so big and uses such little pressure, it rides very easily and similar tires, from two to four feet in diameter, are used on airplanes to make landing easy. The low pressure acts as a cushion of air. On an automobile, they absorb shock due to uneven roads, rocks and other obstacles. Of course, they cost more but the cost is made up by the additional comfort.

A prominent airplane manufacturer has said that the day will come when giant airplanes will be used requiring a tire of this size. And that will be some airplane.

Artificial Weather

THE airship dock at Akron, Ohio, where the giant dirigibles for the United States Navy are built, is so large that it has a climate all its own. It may be raining within the colossal structure while it is perfectly clear outside.

The dock is 55,000,000 cubic feet in volume. The thin metal covering changes its temperature more quickly than does the large quantity of air contained inside. Consequently, when the thermometer falls, the dock cools off while the inner atmosphere remains considerably warmer. When this warm air comes in contact with the cool metal surface, the moisture condenses. Clouds are formed and a brisk shower of rain falls. This is rather convenient as it should reduce the cost of washing the floor. It should certainly keep down the dust, and reduce janitor costs.

A tire twelve feet in diameter and four feet wide. The airplane that can use this is hardly in the baby class.

The Story Behind the I.A.A.P.E.

(*Continued from page* 21)

the "picture hound" some exciting experiences, which may include a free view of the inside of a jail if he is not judicious. However, the members of this society are real sportsmen and as such, make a practice of respecting the rules concerning picture taking, laid down by aviation officials.

Unquestionably you will be glad to hear how this group originated. Mr. Ben H. Heinowitz, the secretary and founder of the club, tells us the story as follows:

"I started in a small way back in '28 to take pictures of representative type aircraft which I found at the local fields I frequented and did some flying from, (mere passenger). After a while, as this hobby became more absorbing, I wondered if there were others through the States engaged in the same hobby. With a bit of scouting around, I made contact with those interested in exchanging aircraft photos. Returns were so gratifying, the thought of forming a club came into mind and on airing said thought, to the fellows who I had started swapping shots with, the idea went over first rate, which as a result, gave us the nucleus for a club, devoted to the exchanging of aircraft photos. The club was officially organized in May 1930, with members in Washington, California, Colorado and New Jersey.

"Since the birth of the club, we have expanded considerably, having accredited member collectors in all parts of the country and abroad.

"MEMBERSHIP is open to all those who fill the requirements. Membership is international. Requirements:

1. Prospective members must show a "listing" of at least fifty (50) negatives of representative type aircraft, from which prints can be had. (Foreign members a listing of 25 negs.)
2. Prospective members must have a working knowledge of photography as applied to aviation, taking shots so that the complete plane shows in the photo, in the view which gives best detail of that particular plane.
3. Prospective members must co-operate in matters of club concern, respecting all rules and regulations.
4. Prospective members must have a general knowledge of the representative production type planes and engines put out by the industry and be able to give the desired information along with photos of the planes.

"There are no dues or officers. However, members are divided into two classes: Juniors and Seniors. The Juniors are free-lance members, corresponding and exchanging at their convenience: while the Seniors are the "backbone" members, active in all club work right along."

Some of the members of this society whose names many readers may be familiar with, are, Roy Millerin, Ohio; Fred Bamberger, New York City; Joe Nieto, Texas; Bob Hare, California and E. Tabio of Cuba.

If you are interested and eligible to join this group of pioneers, write to Mr. Ben H. Heinowitz, Mountain Avenue, Mountainside, New Jersey.

Watch for News of
THE 1933 NATIONAL MODEL AIRPLANE CHAMPIONSHIPS
in Universal Model Airplane News for September

How To Build the Submarine Scout

(*Continued from page* 15)

no added weight in the form of heavy pigmented dope. The fuselage sides and bottom are covered with one piece per side, the turtle-back because of a double curve, is covered in five pieces with the 1/16" overlapped edge in shingle-fashion. Start at the extreme end and work up.

After doping, the lettering may be done, using a straight-edge ruling pen and black waterproof ink. The top wing is covered in four parts. First cover the bottom right half, then the left, top right, top left. Use adhesive on the entering, trailing edges and wing tips only. Each bottom wing half is covered with two pieces, top and bottom. The wings are now doped and the circled stars may be added. In this case a stencil was made and the blue and red sprayed on, using a 5&10 insect gun.

The horizontal tail is covered with two pieces on one side only, the top, so as to have a light tail. The rudder is covered on one side with one piece. The red and blue stripes were sprayed on before covering. The tail is not doped. It is best to cover it near a radiator or warm stove so as to prevent warping. Use only one coat of dope wherever required, one part of clear nitrate dope plus three parts of acetone, will do nicely.

Assembly

To assemble ship, cement left half lightly to side of fuselage, No. 2 and No. 4. The wing may be pinned against the bottom longeron. Check for correct position and zero incidence, then add other wing half to other side and check for slight negative incidence (1/64"). No connecting spar or continuous bottom spar is required.

The top wing is now placed over the cabane struts and cemented in the center rib notches. If a righthand prop is used, give the top wing a little wash-in or more incidence to the left half. Otherwise give opposite to this and bottom wing.

The N struts are now made by sanding several balsa lengths to a streamline section No. 1. Cut to size and cement to the paper on the wings above and below the wing spars. First connect the two front spars, then the two rear spars. When dry, set in interconnector No. 2, thus completing the reversed N. Do same to other side.

Flying the Model

Before attempting to fly the model, it is important to get it to glide respectably. First see if the balance or center of gravity position is right. Support the complete model, rubber included, by the top wing, by the fingertips which are to be between the spars of the top wing. The model if built carefully, will balance on an even keel. Otherwise rectify the ship so that it will balance. With the tail surfaces set right, the model should have a glide of at least 5-1. When the model glides well, it may be given a test flight and will no doubt, fly right at the start.

If, after launching, the model flies level or drops a little but begins to climb as the power is used up, alter the line of prop thrust by placing a 1/32" more or less balsa piece between the nose piece and nose below the prop shaft. If the model upon launching, tends to climb abnormally or fly in a "stalled" position, insert a similar balsa piece above the prop shaft. To use a winder, attach to the prop shaft in that triangular opening, have an assistant to hold the model by the nose and steadied at the tail, stretch rubber and wind as usual.

With a prop carved from the specified blank, three strands of 3/16" flat is just right under a winder. For hand winding, use four strands of ⅛" flat.

To get a rubber motor into the fuselage, proceed as follows: Have a stick ¼" x ⅛" x 15" notched at both ends. Stretch the complete motor with an S hook across this notched piece, with the S hook at the extreme end out parallel with the stick, using the nose piece opening as an entrance. The stick with the stretched motor is carefully pushed towards the tail hook. By observing the S hook through the bottom opening, the S hook can be easily attached to the tail hook. Then the rubber is slipped from the opposite end notch, the prop hooked to the end and stick withdrawn.

To get a motor out, simply unhook from shaft, let rubber drop inside, detach S hook and shake rubber out through cockpit.

Indoor flights of 60 seconds are possible from this model: outdoors, time it with a calendar.

Helpful Hints for the Model Builder

(*Continued from page* 16)

fuselage 1/32" undersize. (B), wet pattern of 1/32" sheet balsa is molder around each fuselage half with the aid of 1/16 cross cut sheet strips and rubber bands. During this procedure some "V" cuts may be necessary if you don't use balsa of the right texture. When the forming is finished dry the halves in a warm place.

Cylinder fairings, streamline head rests, and various fuselage projections may also be made after this method.

(C) shows the trimming of the surplus pattern.

(D) designates the possible positions for thin sheet formers like the one (E). The formers are made in halves from templet stations on the solid halves, and cemented into their places before the halves are assembled. The cockpit is cut with a sharp knife to suit the builder. The rear hook may be mounted as the builder sees fit but many builders use a block cemented in the extreme rear before the halves are assembled.

(F) is a form on which the lower wing fillet and center section may be formed of sheet balsa to fit the fuselage above. Two forms are made, one right and one left. The sheet formed need only cover the front and top of the wing and fit snugly against the side of the fuselage. The remainder of the ship is built on standard construction.

The use of this type of fuselage fits in well with the newer type, streamlined real ships that are so hard to copy in models with the standard built-up construction.

The Aerodynamic Design Of The Model Plane

(*Continued from page* 20)

as a sesame of knowledge, is due to the fact that they consider model planes to be "toys:" How far they are from the actual truth of the matter, many of you realize full well. It seems to be a case of aeronautic theory and experiment being organized so intensively along one line of procedure that many occupied with the solution of aviation problems, fail to see the value of other systems which might prove their ideas to be inferior and out of date. Apparently, in other words, they are in a rut.

This refers to the commercial, standardized engineering practices. Many individual thoughtful engineers and true scientists are searching diligently for new ideas. Don Cierva is an outstanding example. He was laughed at by aviation experts because his ideas did not conform with the "standard." So, dear readers, if your ideas are different, do not be discouraged. Prove they are right but accept the truth if you find they are wrong.

It remains for this new generation of aeronautical engineers, unhampered by dogma, to exhibit some of the *original* thinking which they have developed through necessity, in solving their model problems.

(A) Fig. No. 72 shows the standard arrangement of factors and the new one (B) where the C. of G: is farther to the rear: In (A) the C. of G. is in front of the center of lift: In (B) it is to the rear of it. .

Due to the C: of G. position in (A), the stabilizer must be set at a negative angle of attack in order to create a down pressure at the tail of the model, which holds the nose up. In (B), as the C. of G. is behind the center of lift, there must be a pressure on the stabilizer acting upwards to prevent the C. of G. pulling the tail down. In other words, the stabilizer must be set at a *positive* angle in order to create a *lifting* effect. Undes these conditions, the stabilizer is actually a lifting surface.

Though the stabilizer should be set at a positive angle, this angle should be about two degrees less than the wing as in arrangement (A). The correct amount is from ½ degree to one degree. The wing should then be set at 2½ to 3 degrees. The figure shows this: *These angles should always be measured relative to the line of thrust.* The center of gravity in system (B) is located at a point about 40% to 50% of the wing chord back of the leading edge. See Fig. No. 72 (B):

This arrangement is unorthodox according to customary practice of design, but it is so merely because designers are not familiar with its advantages and have been scared off because of a greater tendency of planes to spin when designed in this way. They fail to realize that this spinning tendency can be successfully eliminated merely by adding more *fin area*. About 10% more than the usual amount should be used.

A plane designed according to this system (B) will not dive out of a stall except unde very extremely conditions: It will merely "squash" down into normal flight again after a stall. Thus, the fangs of the deadly stall are pulled.

(*Continued on page* 47)

A NOTICE

UNIVERSAL MODEL AIRPLANE NEWS has no connection whatsoever with any model airplane company, or with any firm advertising in its columns. No employee or officer of this magazine is permitted to accept employment, or to perform any service for model aircraft or similar firms. Neither has UNIVERSAL MODEL AIRPLANE NEWS any associated publications of any kind dealing with aviation or the miniature aircraft hobby.

DEALERS

The list of model airplane dealers to whom "Universal Model Airplane News" will send by direct mail timely items of commercial news—is open for additional names until Aug. 1st. Please use business letterhead. Address: Dealer Department,

UNIVERSAL MODEL AIRPLANE NEWS
125 W. 45th Street New York City

ORDER WITH CONFIDENCE FROM ADVERTISERS IN

UNIVERSAL MODEL AIRPLANE NEWS

The Baby Seagull

(*Continued from page* 18)

propeller is ruined in the making. Push a pin through the blank from the front edge at the center for the shaft hole, then taper the flat sides from center to the tips. Scald thoroughly and place the back edge on a small board so the pin can be pushed in perpendicular to the board. Bend the tips over cambered blocks having the desired pitch and fasten with bent pins. Bake until dry and apply a coat of dope so the pitch and camber will stay. When dry, remove and sand to last balance.

The baby is powered with one loop of ⅛" flat rubber for endurance or two loops of 1/16" flat rubber for speed and altitude with the same power weight.

Model News From Other Country

(*Continued from page* 30)

Zealand, under the leadership of Basil Gould. These young men have gotten some very realistic effects by using models to stage air crashes and incidents that occur occasionally in aviation.

One would say that picture No. 5 shows a very realistic crash in which the planes caught fire and were being consumed by the flames. Actually this picture was staged with models. One will note the miniature ambulance and figures in the foreground: This helps to give a very realistic effect, especially the injection of the ambulance.

Picture No. 6 apparently was taken from another machine in the air, looking down upon a plane on the ground ready to take off. This effect was obtained by cleverly arranging the relative distances between the camera and the two planes.

It seems that they are extending the art of flying into various fields for the ship shown on the ground in picture No. 6 is piloted by a white rat. We would say that this is the much desired fool-proof airplane. The white rat is strapped into the "ratpit" and the model proceeds to take off like the real ship, with this added load. Whether the rat has been taught to operate the controls, Mr. Freshman does not tell us. However, judging from the ingenuity shown by these model builders, we are in the mood to suspect that this might be the case.

One of the most active builders in Otago, New Zealand, is Cliff G. Andrews. He has personally sent us picture No. 7 which shows his well built model Dornier DO-X. This is one of the finest looking DO-X models that we have seen. He has paid considerable attention to details, as you can see. This ship has a span of 38 inches and is solid throughout, being built of clear pine. The fuselage is made in three sections, one piece from the keel to the bottom of the root, another to the bottom of the cabin and a third the cabin itself. The portholes and windows are celluloid. The engines are made of wood and are covered with a metal cowling. This model won first place in a recent contest for Andrews, for which he received as a prize a flight with Sir Charles Kingsford Smith in the famous Southern Cross. This contest was held in Dunedin, New Zealand.

Air Ways Here and There

(*Continued from page* 27)

to equip this ship with aileron control wires and pulleys. Wheel blocks are in front of the wheels. Other features are cushioned seats, dashboards with all instruments, throttles, ignitions and fire extinguishers that work: This latter feature in our opinion, wins the fur-lined bathtub, (speaking figuratively, of course). The only thing that has been left out of the model is a miniature fire. The propeller is of the laminated type. Anzalone says that he has tried to put everything on this model that is on the real ship: He certainly has succeeded very well.

RAYMOND C. NELSON of 312 South 1st Avenue, Logan, Iowa, sends us picture No. 13 of his uncovered Howard Racer. This shows a neat job of frame construction. The ship has a wing span of 20 inches and is composed of 160 parts. It weighs ⅝ of an ounce.

Picture No. 14 shows a "Pathfinder" flying model constructed and flown by William K. Meitzler, Box 101, Lehighton, Pa. This model is a very steady and consistent flyer as the picture will indicate. Meitzler has been very careful to state that this is not a "faked" photograph.

Robert McKee of 702 Ridge Avenue, Zanesville, Ohio, is responsible for the Gee Bee shown in picture No. 15. It is not hard to imagine that you are looking at a view of the full size craft. However, this is merely a very carefully constructed model. It required 140 hours to complete the construction: The model has a wing span of 19 inches. The details of construction are as follows; for those who might be interested.

The front half of the fuselage is built up of balsa stringers and bulkheads. The space between the stringers is filled in with 1/16" balsa and sanded down: The space is then covered with Jap tissue and doped. The motor is built up of corks wound with wire, with dummy spark plugs and wires inserted. The pushrods are of 1/16" reed. McKee finds that by carving the prop blades separately and inserting them into a hub made of rolled sheet aluminum, one can very easily make a very realistic all metal prop.

Picture No. 16 shows a Polish P6 which was built by Harry Trimble of 9-B Forsyth Avenue, Fort Riley, Kansas. We wish to compliment Trimble on the very excellent pictures of his models which he submits every month. Mostly all of them are good enough to reproduce properly.

CLUB NEWS

ONE of the large clubs which is prominent in model aeronautics in New York City is the Brooklyn Eagle Junior Air Legion. This club is drawing a lot of attention at the present time because of the official Fifth Annual New York City Model Plane Derby which it is conducting, under the supervision of New York City Department of Parks, John E. Sheehy, Commissioner, and Bureau of Recreation, J. V. Mulholland, Supervisor.

A full set of rules and requirements may be obtained by writing to Mr. Lawrence Shaw, c/o the Brooklyn Eagle Junior Air Legion, 26 Johnson Street, Brooklyn, N. Y.

This meet is to be held at the Sheep Meadow Field in Central Park, on Saturday, July 15th. The Junior Air Legion is particularly active in endeavoring to get ready for this meet and for the National Model Contest which is being held on June 27-28. Many club members will make use of the experience obtained in competition at the National Contest to stage a very excellent showing at the New York City Derby.

This Derby will be under the direction of Mr. Lawrence Shaw. He will be assisted by Capt H. J. Loftus-Price and men prominent in model plane activities who live in the neighborhood of New York City.

The events which will be run off at the meet are twin pusher, all-balsa glider, commercial model and autogyro. A replica model event is also in the line-up with two classes, A and B. Class A is for solid replica models with a wing span of not less than 18 inches and no more than 20 inches. All parts must be home-made. Class B is for solid models with 6 inch wing span either built from your own materials or a kit. Possibly the most interesting event in the Derby will be the autogyro event.

FOR those young fellows who like good eats, a banquet at the Half Moon Hotel, Ball Room on Coney Island's famous boardwalk, will be unusually attractive. This will be held on Saturday, July 22nd, for the first five place winners in each event, as noted.

All cups and medals awarded will be engraved with the name of the winner and other Derby information and event details.

The meet will be open to all boys and girls living within 25 miles of the City of New York who are between the ages of 10 and 21 inclusive. A complete seven page booklet containing an entry blank, general rules, event rules, model rules, list of awards and other information will be sent free upon request to Mr. James V. Mulholland, New York City Department of Parks, Arsenal Building, 64th Street & 5th Avenue, New York City.

"WE appreciate the chances for error on a small course and are lengthening our course in harmony with the advance in design and performance. A 300 foot course would be ideal, but not at present. Let me explain the reason, as those of us here in Lakewood see it after struggling through six contests. In the first place, an ideal location for a speed contest is indoors, where wind is barred. Speed contests held outdoors over a reasonably long course would have to be flown with the wind and that means misrepresentation of speed. 300 feet is rarely accessible indoors. Second, our contests would probably now be extinct if they had been started over such a course. Why? Discouragement. The percentage of contestants able to fly such a course consistently would be very low, even now, after as many contests as we have had and these Lakewood fellows are skilled, up and doing model fans.

"We are lengthening our course after each contest lately and I am sure that

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A

REAL BARGAIN

On page forty-two in this issue we are offering you an opportunity to save yourself 75c on a year's subscription to UNIVERSAL MODEL AIRPLANE NEWS... added to that you get 75c worth of merchandise! Think of it... in return for your subscription fee of $1.65 you get back the equivalent of $1.50 plus 12 issues of UNIVERSAL MODEL AIRPLANE NEWS. If you are quick to recognize a keen value, then you won't hesitate to subscribe right away.

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The Man They Left Behind

(Continued from page 7)

had more than once proved to be a friendly ally and deadly foe in this same respect.

Before the young Frenchman could collect his wits again after this surprise attack, the German already had made a perfect target of him and peppered plenty of shells into the Spad.

Back home in the quiet quarters of his barracks room Guerin had spent long hours carefully rehearsing his plans for his first air encounter. He thought carefully just how he would go about the job of tearing his adversary to bits while he himself slipped unscathed through the hail of bullets that the imaginary foe was shooting. But stark reality was a far different story from the sweet day dreams in which Guerin had spent the tedious hours of inaction.

Instead of annihilating the foe at his leisure, Guerin had yet to fire a shot; rather than dodging and ducking with a well-timed ease the many bullets of the enemy as he had hoped to do, the Frenchman on the other hand, found himself neatly caught in the throes of a vicious barrage.

The last named element was the foremost consideration of the moment and Guerin forced his little ship into a sudden and daring sideslip. That took her off her course promptly and confounded the German for the moment.

Before the latter could reconcile his aim to the Spad's new position, Guerin had succeeded further in putting her through a perfectly executed loop that ended with the enemy caught flatfooted, as it were, and in a vulnerable position himself for the Frenchman's gun.

The pilot of the tricolor ship seized his sudden opportunity with gusto and showered the Boche plane with dose after dose of leaden pills. In fact, so intent was Guerin upon bringing down his first enemy plane that he fell into the common fault of the usually overanxious novice and just poured lead as if it were an unending supply like the waters of an eternal spring.

Few of the early shots took much prominent effect upon the Boche craft as its pilot was himself an able flier and handled his craft in a most credible fashion. Most of the well intended shots Guerin sent his way, were wide of their mark as loops, banks and endless slips and dives baffled the Frenchman's every effort to deliver the final telling blow.

IN THE meantime, the invader took full advantage of each chance that came his way to fire at Guerin's plane which soon began to show an alarming amount of suffering from these deadly blasts of the German's gun.

This condition could not go on much longer, Guerin realized and he set himself resolutely to the task of dispatching the enemy with somewhat cooler precision. Once he had reached this decision he drew off from the combat for a moment, allowed the German to circle a bit and then, giving his engine all the gas her popping cylinders would take, headed into battle once more.

Flying at an altitude a few hundred meters higher than the German during the early approach, Guerin suddenly dived sharply till his ship had fallen well below the foe. Then, just as quickly, the Spad was nosed up sharply again. The Frenchman's coolly calculated maneuver proved to be a perfect bit of strategy. His ship came up almost directly under that of his antagonist from Kaiserland.

The Spad spit steel as she winged her way upward and every shot seemed to find its mark in the soaring hulk of the German as he tried in desperation to elude the effects of the Frenchman's carefully executed coup.

Too late, however. At so close a range the hundreds of shots that poured into him were too much for the German. His craft began to waver helplessly and then commenced a plunge toward earth.

No evidence of smoke appeared and Guerin suspected the usual trick of feigning mortal injury. Airmen often employed this stunt to delude an apparently victorious adversary. Then, once beyond the range of his guns after a long downward swoop, they would level off and duck for home.

Guerin was determined not to be cheated out of his initial triumph by such a trick so he followed the falling plane closely. But this descent of the German was no hoax. Despite the fact that the ship showed no material evidence of fatal damage, she continued her even fall. Although the ship landed heavily behind the French lines, she did not crash badly nor catch fire. Spectators of the combat rushed to the spot with drawn revolvers to subdue the German were he to attempt either to escape or set fire to the craft.

But neither happening transpired. The pilot remained slumped in his cockpit and even the motor continued turning over. Advancing more closely, yet with due caution, the soldiers discovered that the German was dead. An inspection revealed that he had been shot a number of times through the head and upper body. Guerin's final fusillade had accomplished its purpose with complete finality.

When the young Frenchman had himself landed at his airdrome he was soon appraised of the result of his first conquest in the air. Smilingly he accepted the shower of congratulations that poured in on him.

Later, the main party returned from their expedition and the story of Guerin's accomplishment quickly circulated. He was again the proud recipient of further felicitations. Needless to say, none thereafter suggested leaving him home again because of lack of experience.

The official citation that followed his first triumph stressed the courage and spirit he had shown by going aloft despite his inexperience to do battle with a seasoned enemy flier.

ABOUT the only evidence of inexperience that Guerin had displayed in this initial encounter was the needless waste of precious ammunition. As this was a common fault among the newcomers in the ranks of fighting airmen, it was not regarded as a serious weakness.

Veterans all learned to conserve their shells through long and bitter experience, and this lesson too, Guerin was soon taught. How close he came to disaster instead of distinction no one knew better than himself.

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Build This Pusher That Goes Places

(*Continued from page 23*)

thoroughly and use common sense in flying the model. You will then have no trouble.

All balsa in this model is to be of medium hard grade, though it would be best to use hard balsa for wing and elevator spars.

Propeller

Take plenty of time on the prop. An inefficient prop will cut down considerably on the duration.

The prop block is 1 1/4" x 1 3/4" x 12 1/4", which gives the prop a theoretical pitch of 27 1/2". Cut the blank as shown on the drawing, cutting away the shaded parts. Drill a hole .002" dia. for the prop shaft in the exact center of one of the 1 3/4" faces.

Do not thin out the propeller too much. The hub should be 3/16" thick and 3/8" wide, the blades tapering out evenly to the tips. The blade shape is shown on the drawing. The blades have a camber of 1/8" at the maximum width. Balance the propeller now.

Paint the prop with three coats of light dope. Sand lightly between coats. Give final coat of banana oil and polish. Put two coats of cement on the hub. Balance the propeller again making sure that it is perfectly balanced.

The hub protector is made of .010" sheet brass and a hole of .038" dia. is drilled through the center. Cement in place making sure that the protector is perpendicular to the shaft hole.

The prop shaft is made of No. 15 music wire. It is passed through the hub, bent over and cemented to the outside of the hub. Do not cement the end into the balsa. It is sure to pull through eventually. Two free washers, 1/4" dia. are used, preferably of phosphur bronze.

The propeller when finished should weigh about 2/10 oz.

Wing

TAKE plenty of time on the wing; a poor or a "it's good enough" job will not give the model the maximum glide and of course will cut down on the duration.

Make the ribs first. They are my adaptation of the Rhode St. Genese 26 airfoil. There are 33 ribs altogether, one for each inch of wing span. With the ribs so close together there is a negligible amount of paper sag and so the airfoil gives its maximum efficiency.

Make a brass template of the regular rib and one of the false rib. Cement the two together while filing the outline and the spar slots. Cut 16 regular and 16 false ribs from 1/32" sheet balsa, and one regular rib from 1/16" sheet balsa, the last being the center rib.

After cutting the spar slots, take small pieces of spar stock and put all the ribs together. Then sand until all surfaces are the same. However, if there is a discrepancy in one or two of the ribs make new ones, do not ruin the whole set. Sand the upper and lower cambers, slightly rounding the edges so as to prevent any chance of the ribs cutting the tightly-doped covering.

The spars are of 1/16" x 1/8" x 32" hard balsa. Be sure they are perfectly straight. The leading edge is of 1/4" balsa, 32" long. Sand and scrape to the shape shown. The trailing edge is of 1/16" x 3/16" x 32" balsa. Sand to a knife edge as shown.

Assemble the whole wing, with the exception of the center rib, on a level surface, preferably a drawing board. Be sure all ribs touch at all points on the bottom. Cement and leave to dry over night.

Cut spars at center and then cut them so that the center rib can be installed, with each half of the wing blocked up 1 1/2" at the tip rib. Be sure the spars fit together evenly. Cement and leave to dry.

Install reenforcements as shown in sketch. The leading edge reenforcement is for the front wing clip and is of 1/8" x 5/16" balsa, fitted between the center rib and the first false rib on each side. The rear spar reenforcement is for the rear wing clip and is built up as follows: cement a piece of spar stock on top of the rear spar, then cement 1/32" sheet of balsa to each side of this. The trailing edge reenforcement is made of 1/16" sheet balsa, cut in a right triangle with 3/4" sides, and the grain running 45 degrees to the center rib. This prevents the rubber attachment band from crushing the wing. The tip reenforcements are attached to the three spars and are small triangular pieces of 1/16" balsa, with the grain running 45 degrees to the spars.

The wing is covered with Japanese Imperial tissue attached with banana oil. Be sure there are no wrinkles. Then spray lightly with water. When perfectly dry, dope the wing with five coats of light dope. It is a good idea to dope the bottom a bright red on the last two coats. This makes the model easily visible at high altitudes and there is less chance of losing the model. Use any good light dope. A good dope is five parts of acetone to one of banana oil.

Make the wing clips and attach them last. They are of the double grip type and are made of No. 11 music wire. The front clip has a lift of 3/32" and the rear clip has no lift. Scrape away the paper from the clip reenforcements at the correct places and cement the wing clips in place. See that they are in line and that the arms have correct lift, to keep the wing level with the motor stick. Do not cement the clips without first scraping away the paper, otherwise the clips will pull loose later. The wing should weigh 65/100 oz.

Elevator

THE elevator construction is the same as that of the wing. However, there are a few points that differ. The ribs are cut out the same as for the wing, and sanded the same.

However the spars are 1/16" x 3/32" x 6" hard balsa. The leading edge is 1/8" sq. 6" long, and the trailing edge is 1/16" x 3/16" x 6" balsa.

The elevator is assembled in two pieces. This because of the tip rib having a greater angle of incidence than the center rib. Assemble as you did the wing. However, put a 5/16" block under the front spar at the wing tip. Cement each half when as-

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Who Developed the Aeroplane?

(*Continued from page* 17)

day aeroplane.

NOW we come to the two men every American should be glad to call countrymen of theirs: Orville and Wilbur Wright.. These two men came to Dayton, Ohio in 1890 and started a bicycle business of their own which trained them remarkably well for their later field of endeavor.

After the death of Lilienthal in 1896, they started their investigation of human flight. They studied all the aeronautical literature then available, particularly the papers Lilienthal and Chanute had written. After their studies the Wrights started on a long series of practical experiments. They constructed a wind tunnel in which they tested model wings of various shapes and curves and from these tests they prepared a series of tables which were of extreme value when they started building their machines.

From all their experiments they came to the conclusion that three main problems confronted them. They were: 1—construction of the wings; 2—method of drawing and applying power; 3—balancing and steering of the craft after it gains the air. The Wrights concentrated on the control problem and their preliminary researches lasted several years. By 1900 they felt as though their researches had reached the stage where they could begin practical work on gliding.

They started their practical experiments at Kitty Hawk, N. C., which was the best place suited for their work. The Wrights decided that the Lilienthal method of body control was not effective enough. They incorporated in their first glider a system of control which consisted of a front elevator and a warping of the extremities of the wing, which they moved up and down by a central control stick. Through this method they could control their machine easily while it was in the air. Their first glider had a total lifting surface of 165 square feet. On its preliminary tests it was flown as a kite with operator in position so as to gain full knowledge of the reactions of their system of control. They only made a few flights in 1900.

IN 1901 they constructed a biplane glider which had a wing area increased to 308 square feet. In this glider the Wrights made glides of 300 feet and more and after reducing slightly the chamber of the wing, they were able to make flights in a head wind as high as 27 m.p.h. The Wrights spent the rest of 1901 in laboratory experiments.

In 1902 they made a new glider with a wing area of 305 square feet in which they made between 700 and 1000 flights, the longest being a glide of 622½ feet. After these successful flights, they felt that they had gained enough data on practical gliding, so they started on their next problem; namely, motive power.

The Wrights tested all the eligible engines of that time but were disappointed, so they built a four cylinder motor of 15 h.p. Then they constructed their plane and in December 1903 were ready for the big endeavor. But first of all they had to devise a launching system for their plane. This system was very ingenious. They had a track about 70 feet laid along the ground, on which ran a small trolley which carried the aeroplane. To gain initial velocity they had the trolley connected to a weight in a portable tower. When the weight was released it catapulted the plane into the air.

Finally on Dec. 17, 1903 they were ready. Orville was the pilot that history-making day. The first man-carrying flight lasted but 12 seconds. They made several flights that day, the longest being the fourth, in which they stayed in the air for 59 seconds and covered 852 feet against a 20 m.p.h. wind, and thus man conquered another element, the air.

The next day the machine was overturned by a gust of wind, rendering it useless for the 1903 season. It was now the aim of the Wrights to develop the machine so that they could present it to the world in a practical sense. During 1904 they made a circular flight lasting 5 minutes, before a group of newspaper men and by 1906 they could accomplish flights of appreciable duration, while maneuvering in the air and returning to the starting place.

AT this time Europe began to sit up and take notice of our American brothers and was surprised at the progress they had made. In 1908, the Wrights placed their affairs into the hands of a business syndicate and started out to introduce their machine to the world. Wilbur took a machine to France to the French Government. Orville remained in the United States so that he could construct a machine for the U. S. Army. Orville's machine made several notable flights at Fort Meyer, Va., and was accepted by the Army.

Wilbur came back to the United States after making quite a name for himself abroad and in 1912 he died of typhoid fever. The world lost a great citizen but his brother Orville still lives to carry on the great work.

By 1906 the whole world was interested in aviation and the aeroplane made its debut in Europe. The two men who were responsible for the introduction of the aeroplane in Europe, were Alberto Santos Dumont and Louis Bleriot.

Dumont was a noted aeronaut before he became interested in heavier-than-air craft. In 1906 he started building aeroplanes. His machines were of a very distinctive design in that they were biplanes of box kite construction with pronounced dihedral. The pilot was inclosed in a fuselage as in our modern planes. This plane made the first efficient flight in Europe.

Bleriot was attracted by the possibilities as far back as 1896. He was first intrigued by flapping wing devices but soon changed when it was apparent to him that these devices were impractical. He experimented with gliders, some biplanes and some monoplanes. Out of these experiments, he conceived the Bleriot Monoplane which will always be remembered for its wonderful flights. The most notable of these was the flight across the English Channel. Bleriot made the Europeans air-conscious and will be long remembered for his great work.

Next month: Glenn H. Curtis
Henry Farman
The Great Influence of the World War on Aviation.

Wanderers of the Sky

(*Continued from page 5*)

loon crew when using the drag-rope. The craft is permitted to drift into the trees. The wind acting upon the bag has sufficient force to drag the basket through the tree tops and it goes bouncing from one tree to the next. The crew invariably crouch on the bottom of the basket to avoid getting pulled out by eager limbs and the basket is sufficiently pliable to eliminate any danger of physical damage. A bit of sand over the side immediately lifts the basket out of the trees and into the unobstructed air.

An expert balloon pilot must be a master of aerology and likewise he must have a thorough understanding of convection currents which keep the atmosphere in constant motion. For example, as the sun beats down on a ploughed field the heat is reflected upward. This in turn starts a current of air rising and if a drifting balloon passes through this vertical current it is carried upward. Similarly, the green foliage of a forest absorbs the sun's rays thus cooling off the air directly over the woods and a descending current is started. This will cause a balloon to drop very quickly.

SIMILARLY a body of water is colder than the surrounding land during the day and when over it the balloon will descend. But, at night the earth cools off quicker than the sun and an ascending current is to be found over water after sunset. If the sun is covered by a drifting cloud the gases in the envelope will cool off, contract, and lose lift thus causing the balloon to lose altitude. Should a balloon drift over a large layer of clouds and the pilot desire to pass down through them, he will find certain difficulties. As the bag nears the upper level of the cloud layer he will find that the sun is reflected off the white surface and the ascending currents will literally bounce the balloon off the clouds. But, if he succeeds in piercing the cloud floor and his envelope is drawn into the cool clouds, the contracting gases will cause the craft to start falling like a plummet and considerable ballast will be required to check the dangerous velocity. That the balloon pilot should be a student of nature goes without saying.

As a balloon gains elevation the density of the air decreases and consequently the hydrogen within the bag expands. If no outlet were provided the balloon would eventually burst. A long sleeve is led from the lower side of the envelope and is always kept open to permit the gas to escape when necessary. This also explains why Professor Picard's stratospheric balloon had such a peculiar appearance before taking off. To the casual observer the balloon had only a small volume of lifting gas while the major portion of the bag was unfilled. This condition was true on the surface but at the extreme altitude reached during the flight the expansion of the gas was such that it completely filled the huge envelope and so gave it the great lifting power necessary. As a matter of fact the gas in his craft expanded from 100,000 to 500,000 cubic feet!

When the balloonist has decided to land his craft he valves out a portion of his gas which causes him to descend. As he nears the ground he can gauge whether or not he is falling too fast. If he is, he will drop overboard enough ballast to ease his landing. Just before he strikes the ground he will pull his rip cord which will tear a huge gash in the envelope thus insuring the rapid escape of gas and making certain the balloon will remain on the ground.

NIGHT flying in balloons is one of the most interesting phases of aeronautics. The air is usually smooth when the sun goes down below the horizon and the currents of air follow the contours of the earth with remarkable regularity. Night flights are generally made at low altitudes in order that landmarks may be sighted and located on the maps. Perhaps the novice will see a 2000 foot mountain directly ahead of the drifting bag—a sight which will cause him no end of worry due to his three hundred foot altitude. The experienced pilot, will sit quietly and do nothing about it. To the amazement of the tyro the balloon will begin climbing as it reaches the bottom of the elevation and will continue on the upgrade maintaining its altitude over the surface at three hundred feet! Then when the summit is reached the craft will travel down the slope holding its altitude constant!

Hydrogen is the lifting gas ordinarily used in free balloons although cool gas, hot air, and other gases have been used. Helium is never used because at the end of each flight all gas is permitted to escape. The necessity for this makes it prohibitory to use expensive helium. The use of explosive hydrogen makes it imperative for the balloon pilot to avoid high tension lines at any cost. Similarly, he must avoid thunder clouds which might result in the discharge of electricity.

Another danger that might arise in ballooning is to have a stuck valve when the craft is rising fast. It is not impossible that the balloon might rise into a region of reduced oxygen and cause difficulty for the crew. Such a incident actually happened when the valve froze closed during a cold moist day. One of the men was forced to climb on the outside netting to the top of the bag and break the ice loose in order to permit the valving of lifting gas. These dangers, however, are seldom encountered on training flights.

THE more spectacular stunting qualities of the modern airplane has served to displace this oldest and most popular attraction of the old-time county fair and carnival. But, it can not be said that the airplane is more thrilling than the demonstration put on by the spangled, tight-apparelled parachute jumper that carried on his precarious living with the aid of the hot-air balloon. For the most part this ancient sport and circus stunt has passed on, for its very quietness and slowness cannot hope to cope with the loud roars of a racing airplane engine as the tiny craft sweeps through the pylons with only a narrow margin of safety between the fragile machine and the ground.

Occasionally, however, some startling feat is performed which serves notice upon the world that the science of aerostation is not yet forgotten. The recent flights of Professor Picard have called attention once more to one of the most interesting phases of

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Flying Boats vs. The Atlantic

(*Continued from page* 9)

Paris? While Vilhjalmur Stefansson has made a strong plea for the possibility of flying over the Arctic regions with due precautions, and which eventually we may expect the North Pole to be criss-crossed with airways from North America to Asia and from North America to Europe, for the time being we can conjecture that the first trans-Atlantic flying boat service will be on the pleasanter though longer southerly route.

The great drawback to the southerly route as we have stated previously, is the long jump between the Bermudas and the Azores. Nineteen hundrde miles of bare ocean with comparatively few steamships navigating these waters. Granted that the range of 2500 miles is obtainable, the huge fuel load to be carried will seriously diminish the number of passengers and the amount of mail or express matter that can be carried. Payload is the very essence of profitable operation and it may yet be a number of years before the southerly route, if technically feasible will be commercially profitable. These considerations bring us to the last phase of this article: the feasibility of some form of mid-ocean station on which refueling will be possible.

Mid-Ocean Airports

THE most ambitious project along these lines is the Armstrong Seadrome, of which a photograph is shown, with the inventor in the background holding a model of an ocean liner which shows the relative proportions of the proposed seadrome. The artist's conception of the seadrome is interesting.

Exhaustive tests have been made of the seadrome in a tank where conditions of hurricanes, strong gales and breezes were simulated. The model withstood all of the tests, some of which simulated waves up to 180 feet in height. During all of these tests, the seadrome remained practically level, without pitch or roll. This was made possible as the result of the theory of design. The largest ocean waves are not felt at fifty feet below the surface. Therefore, with all of the flotation placed well below the surface of the sea, the seadrome would be immune to disturbances in the roughest storms.

The seadrome is designed to move with the wind through a series of winches and drums paying out and dragging cables so that pilots can always land into the wind. A huge anchor system has been developed which will drag on the ocean bottom. Every possible refinement of lighting, radio beacon and other aids to navigation have been provided for. The ambitious project calls for the construction of seadromes to be anchored at 400 mile intervals south of the regular steamship lanes.

Theoretically possible, splendidly worked out, the Armstrong Seadrome depends for its realization on financial considerations, and also on the problem of guiding planes from seadrome to seadrome in conditions of fog or other zero visibility.

While the Armstrong Seadrome is perhaps too ambitious for these depressed times, the Germans have been making very successful and practical experiments with an old 5000 ton liner, the "Westfalen", which has been converted by the German Lufthansa and stationed in the South Atlantic, halfway between Bathurst, British Gambia, and Pernambuco, Brazil. The recent successful demonstration of launching and picking up on the "Westfalen" has aroused much interest.

The old "Westfalen" was transformed into a flying airport by installing upon her deck the largest catapult for airplane use ever built and by equipping her with a drag sail to be used in taking the planes on board. This catapult is powerful enough to shoot an airplane into the air at a speed of 95 m.p.h. The catapult on the "Westfalen" is 170 feet long. It runs along the greater part of the ship's side. In launching the airplane along the 103 feet rails of the catapult's length, compressed air is used, which goes into a specially designed compressed air engine.

THE pilots sit stiffly, with their necks pressed against springs, waiting for the enormous pressure on their bodies at the instant of launching. Only the strongest men are able to stand the strain. As a German writer puts it:

"The man at the lever gives a sign, the pilots grow more rigid, the motors are switched to full speed, the lever is turned down. Like a rocket, moved by an invisible force, the heavy plane is rushed down the catapult rails, gathering speed at an amazing rate. A second and a half later it is in the air.

In the landing maneuvers, the dragsail of stout sail cloth is lowered into the water from the stern of the liner. It measures fifty-two feet by twenty-six feet and is dragged on ropes in the wake of the liner which moves directly into the wind.

While the ship proceeds at half speed and the sail is dragging below the water line, the flying boat lands in the slick or smoothed wake and runs up to the liner until it floats above the submerged sail. The ship, by increasing its speed, pulls the drag-sail to the surface, and the greater its speed the higher the sail rises until, finally, with the ship going full speed ahead, the flying boat is lifted out of the water by the drag-sail and rests on the sail as a floating platform. It is then easy to take it aboard with a huge crane on the stern. The crane can lift fifteen tons and is about forty-three feet high.

In addition to the catapult, the drag-sail and the crane, there is a powerful radio station on board the floating airport to transmit weather conditions and other reports to the airplanes. It is equipped with long-wave as well as with short-wave facilities, and also with radio direction finders. A repair shop, a meteorological station and accommodations for crew and pilots are provided."

The Future

Whether the future lies with the construction of still larger flying boats, capable eventually of non-stop flight across the Atlantic, or whether the path of progress will lie in the use of comparatively small single engine flying boats, stopping at frequent intervals at seadromes, or mother ships of the "Westfalen" type, is hard for us to say. But we will venture this definite prediction: that within the next five or six years either one avenue of approach or the other will be successful and commercial flying by operators to Europe will have been achieved.

Nor is a similar service across the Pacific entirely out of the question. While the distances in the Pacific are too long on the southerly route, success might be achieved by connecting the Alaskan airlines of Pan-American through Canada with the Northern part of the United States. From Alaska via the Aleutian Islands, the pioneer flights of Lindbergh will be followed to Tokio, and from Tokio lines are already projected to Shanghai, Hong Kong and to the interior of China.

In the meantime the British will be extending their lines to India still further east to the Dutch East Indies and Australia. Eventually every ocean in the world will be conquered by the flying boat just as effectively and completely as the seven seas have been conquered by the steamship.

How To Establish Record Flights

(*Continued from page* 30)

organization or individual vouch for the sponsor."

Anyone who is twenty-one years of age or older may make application for appointment as a N.A.A. Contest Director for model aircraft. An application form will be mailed to any interested person who may fill it out and submit it to the Association for consideration.

So if any of our readers are interested in establishing model plane records, be sure to have your contests sanctioned by the National Aeronautic Association whose address is Dupont Circle, Washington, D. C.

Air Ways Here and There

(*Continued from page* 39)

such a policy of gradual lengthening will be conducive to real development of design and to interest in the contests."

Akron Model Plane Contest

Saturday morning, May 13th at 9 o'clock, Akron, Ohio's model plane builders started a day filled with surprises—for themselves as well as the spectators. Nearly eighty contestants were on hand at the Goodyear Tire & Rubber Gymnasium to enroll, with many bringing two and three models for both the non-flying scale contest and the numerous flying events.

The judging of the '40 non-flying scale models was led by Dr. Karl Arnstein, noted designer of the zeppelins, the "Akron" and the "Macon." Al Engleman with a 1932 Gee Bee Super Sportster, Ted Aleshire with a Boeing F4B-4 and Mike Kostick with an 18 inch model of the U. S. S. Macon, won first prizes.

A 30 inch "single sticker" of Frank Brown's won greatest applause by its duration flights through the topmost girders of the hall. The Junkers monoplane of Clyde Goehring gave continuous exhibitions of stunting while a Stinson monoplane of Mike Kostick's went aloft with a lighted firecracker and a shower of sparks. The explosion which nearly wrecked the plane brought several screams and many questions.

The most amusing incident happened when a young man whose name he withheld, hand-launched his Gee Bee Super

Sport-Springfield type, the motor stick, propelier and cowling making a perfect flight across the hall while said young man dazedly held the rest of the plane in his hand. (A good lesson—you *can* lose your engine.)

THE "freak event was won by Jack Darrow with a hard-to-fly wing-flopping ornithopter.

A complete official list prize awards:

Non-Flying Scale
Al Engleman, High School Div. Gee Bee. 1st.

Lighter-Than-Air
Mike Kostick, U. S. S. Macon. 1st.

Flying Scale Model Duration
Mike Kostick, High School age. 37 seconds. 1st.

Speed Event, Hand-Launched
Brook Wilson. First Prize.

Speed Event, R.O.G.
Fred Mayfield. First prize.

Stick Endurance, High School Age
C. Wilkinson. 3 min. 3 sec. 1st.

Stick Endurance, Under High School Age
William Baker. 43 sec. 1st.

Flying Freaks
Jack Darrow, ornithopter. 1st.

Stunting
C. Goehring, spirals. 1st.

Grand Prize, Duration
Frank Brown, 2 min. 58 sec. 1st.

Grand Prize, Speed
Hubert Wise. 1st.

Pittsburg, Kansas Contest

Another state is heard from this month. In Pittsburg, Kansas, there is an active model club at the Y. M. C. A., under the direction of Glenn E. McClure. Boys from all over the southeastern part of Kansas are members of this club. Picture No. 17 shows a small group with some of their planes.

Jimmie Allen Air Races

We have received some interesting news from Bill Ong who piloted Ben Howard's famous racing planes "Ike" and "Pete" at the Cleveland National Air Races. Mr. Ong is conducting this summer a series of model plane meets known as The Jimmie Allen Air Races. These races are for one type and class of model, the Bluebird, a fuselage type outdoor model with 200 square inches of wing area and weighing not less than four ounces.

Plans for this model are being supplied by the Skelly Oil Company of Kansas City, who is also sponsoring the "Jimmie Allen" radio programs in the Middle West.

The dates and locations of The Jimmie Allen Air Races are:

Tulsa, Oklahoma	July 2
Kansas City, Missouri	" 9
Denver, Colorado	" 16
Lincoln, Nebraska	" 22
Omaha, Nebraska	" 23
St. Paul, Minnesota	" 29
Minneapolis, Minnesota	" 30
Davenport, Iowa	Aug. 5
Des Moines, Iowa	" 6
St. Louis, Missouri	" 13
Milwaukee, Wisconsin	" 20

All of these meets have been sanctioned by the National Aeronautic Association. The winners are being given trips to the Century of Progress Exposition at Chicago.

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Wanderers Of The Sky

(*Continued from page* 43)

aeronautics, that of free ballooning. Paradoxically, the free balloon has made it possible to explore an entirely new space, the stratosphere which is normally considered to be the area above the thirty-five thousand foot level. After years of effort man has been able to push his servant, the airplane, up to a ceiling of only slightly over 43,000 feet. Millions of people have applauded this feat as a remarkable performance which it most certainly is. But, it must not be overlooked that the balloon which long since had been discarded as of little practical value was put to use within a short space of time and with no effort raised a human cargo to the unbelievable altitude of 55,000! And, this is all the more remarkable when it is considered that little if any improvements have been made upon the balloon since the beginning of the Nineteenth Century! True, improved fabric has been introduced, but all the essential parts and the lifting remain the same.

ONE might well wonder what caused the lack of interest in the free balloon for such a long space of time. The answer is simply that the craft could not be steered in any predetermined direction. The balloon was a child of the winds and was forced to drift idly about. Obviously, little practical use could be found for a vehicle of travel unless it could be guided and controlled directionally. There are few travellers who, desiring to land at Berlin, would not be somewhat irritated to find themselves coming down on the outskirts of Rome.

Efforts were made to steer the balloon from its infancy. Aerial oars were devised and mounted in the basket similarly to the oars of a row boat. The pilot pulled his way through the air in a somewhat uncertain manner though it is not recorded what speed records, if any, were made by this means of locomotion. When internal combustion engines and battery driven motors were developed, they too, were mounted on the spherical bags. However the slowly driven propellers were not equal to the force of the wind which drifted the bag to leeward.

At last the elongated balloon appeared to eventually result in the dirigible type airship. Obviously, this form was more nearly suitable for driving through the air and all efforts were then directed towards development of this new type. However, one must realize that, if for some reason, all power is lost due to imperfectly operating engines, the airship becomes nothing more than a free balloon and must be handled as such. Therefore, any type of lighter-than-air craft such as an airship, blimp, kite or observation balloon is nothing more than the Eighteenth Century free balloon. It thus becomes essential to train all lighter-than-air personnel in the operation of free balloons.

The many lives saved during the crash of the airship Shenandoah resulted from the skill of the personnel in ballooning. The broken portions remaining in the sky after the airship broke up were brought safely to the earth as free balloons. Thus, this branch of aeronautics is not only a sport but a means of saving life as well.

The Man They Left Behind

(*Continued from page 40*)

He and two comrades had acted as an escort for a pair of bombing planes. They had flown deep into the German lines to lay a few "eggs" that made a most unpalatable omelette for the unlucky Boches who were in the vicinity of the munition dump which was the point of attack. Several German ships had made valiant efforts to ward off the attack but Guerin and his comrades had succeeded in getting their charges to their destination and back in safety.

With still a few moments remaining before lunch Guerin decided to stay aloft a while and seek out a Boche or two to escort to eternity as a sort of appetizer. A German appeared as if by magic and in a twinkling the two were in the throes of a death struggle.

The foreigner was flying a ship of new design, a trim and speedy craft, the like of which Guerin had not seen before. It was all of a match, if not superior to the Frenchman's aging Spad. To the sporting Guerin that meant about as much as a five yard handicap in a mile footrace. He had often conceded more and won handily. The young German soon proved that, with his superior ship, he was the master of the situation as far as maneuvering went.

Round after round of screaming steel that Guerin poured at him either flew harmlessly by the German or hit spots that produced no material damage. On the other hand Guerin was not so fortunate. Shots passed through the fabric of his wings in such profusion that soon they were in veritable shreads. This shortly began to affect the lifting qualities of his ship and he commenced to experience some difficulty in keeping the little Spad under full control.

Guerin called upon all his art and used every trick he could to work his antagonist into a vulnerable position but apparently to no avail. The German eluded his effort and foiled each clever trap that Guerin had used so tellingly on previous occasions to vanquish a stubborn foe.

AT LAST a momentary break appeared for the embattled Frenchman. In their constant twisting and turning about he had suddenly come up under the German. This fleeting opportunity Guerin took full advantage of and let his gun speak, not only sharply, but volubly.

The Boche seemed to survive the precarious situation successfully and quickly banked about to shower steel upon Guerin. The two ships were coming toward each other now with both aviators determined to make this last effort one of do or die.

The Boche opened fire first and screaming steel flew by Guerin's head, missing it by but only a little, yet tearing still further at the already dangerously weakened range.

The Frenchman had a perfect bead upon his adversary now but when he worked his machine gunc it failed to respond. A quick glance convinced him that the worst had happened. No more ammunition.

Not more than a hundred yards away the German was coming directly at him. Utterly helpless, Guerin only looked in terror at the cross-marked ship that was now drawing so dangerously near. But even in this moment of anxiety Guerin was blessed.

The Boche ship gave off a puff of smoke and then immediately burst into a flaming mass. Her hapless pilot, himself in a frenzy now, abandoned his gun at the very moment that he had Guerin helpless before him and sought to bring his ship to safety. It was beyond that point already, however, and only burned the more fiercely, its earthward plunge gaining momentum.

Thankful for the kind hand of Providence that had intervened so timely, Guerin scooted for the safety and shelter of his airport where his first act upon landing was a firm resolve never to fire another shot that he was not reasonably certain would take effect.

That he was faithful in his promise to himself is evident from his envious record as the war progressed. He became one of the foremost flying experts of the war and a leader in point of victories scored, both official and unofficial.

These latter always got their just due and recognition within the charmed circle of the Aces themselves for they knew well that every German who fell represented the same display of skill, effort and bravery on the part of a comrade whether seen by his eyes alone or those of a host of fellow fliers.

T'was not for them to seek applause
But just to serve and aid their cause.

Build This Pusher That Goes Places

(*Continued from page 41*)

sembled and be sure each half is the same. Check and double check because a little more incidence in one side than in the other is disastrous. When dry, cut spars so that the center rib can fit in when each half is blocked up with a ⅝" block under the front spar and a 5/16" block under the trailing edge. Cement and set to dry.

The reenforcements are the same as for the wing. However the leading edge reenforcement is of 3/16" x ¼" balsa, notched to fit the leading edge. The rear spar reenforcement is the same as on the wing. The trailing edge reenforcement is of 1/16" sheet balsa cut in a right triangle with ⅝" sides and with the grain running at 45 degrees to the trailing edge. The tip reenforcements are the same as those on the wing.

The covering is Japanese Imperial tissue, attached with banana oil and doped five coats of light dope. Treat the bottom of the elevator the same as you did the bottom of the wing.

Make the elevator clips and cement them on as you did the wing clips. The front clip has a lift of ¼" and the rear clip a lift of 1/16". The elevator should weigh 25/100 oz.

Motor Stick

The motor stick is built up. Take plenty of time and see that you get it perfectly straight.

Cut the top and bottom cap strips. They are 1/16" x ⅜" x 30" balsa. The sides are 1/16" x ¾" x 30" balsa. There are two end plugs one ⅜" x ⅝" x 1½" balsa goes at the thrust bearing end, and one ⅜" x ⅝" x 1" goes at the front hook end of the motor stick. The two can plugs are ¼" x ⅜" x ⅝" balsa. There are 25 bulkheads of 1/16" x ⅜" x ⅝" balsa.

First assemble top and bottom cap strips and all plugs and bulkheads. The bulkheads are spaced 1" apart. Cement and set aside to dry. Cement on one side of stick at a time, always making sure the stick is not being bent out of shape. When finished, sand down lightly, round off the ends as shown, and round off all edges. Give the stick five coats of light dope and sand lightly between coats. Give final coat of banana oil and polish.

The two cans are made from No. 11 music wire, the front hook from No. 15 music wire and the thrust bearing is made from ⅛" cotterpin stock. A hole .038" dia. is drilled for the prop shaft. Cement on all fittings, lash with silk thread and dope with banana oil.

This motor stick when finished is practically unbreakable and is unbendable, making a perfect stick for a single pusher.

The motor stick weighs 9/10 oz.

Motive Power

The motive power is eight strands of ⅛"-30 gauge rubber thread. Take 20 feet of rubber and tie the ends in a square knot. This gives an eight strand motor with a slight slack, not too much. The S hook is made of No. 15 music wire.

The rubber together with the S hook and wing and elevator yokes and attachment rubber bands weighs 65/100 oz.

Assembling

See three view drawing. Attach wing and elevator with rubber bands and yokes. The yokes are shown in the drawings and are made of No. 11 music wire. The yokes go in front of the leading edge, the rubber bands go under the motor stick over the wing to the attachment yokes. Thread the prop shaft through the thrust bearing, attach the motor to the S hook and connect S hook to front hook, loop motor onto prop shaft. The entire weight of the plane is approximately 2.65 oz. ready to fly. The least this model can weigh is 2.56 oz. ready to fly.

Flying

GLIDE the model before flying. Set the wing and elevator as far apart as possible. However, do not move the wing back so far that the prop, with slack motor, will catch on the trailing edge. If the prop does this while in flight the plane will spin into the ground.

About 1250 to 1300 turns is the maximum that should be given the motor. It is a good idea to use a good lubricant.

The model should be taken to a large field, preferably an airport, for flying tests. Use only 500 to 750 winds for test flights. Then when set correctly, wind her to capacity and let her go. The model will travel long distances and perhaps out of sight, so put your name and address on the wing.

Well there she is as sweet a crate as ever rode a cloud.

Air Ways Here and There

(*Continued from page* 45)

Haaren Aviation Annex

HAAREN High School is blessed with an extremely fine aviation course which includes all phases of aeronautics. Shopwork is a specialty and practical experience is gained by actual work, constructing parts of large planes. Through the labor of the Aviation faculty, a series of four aviation text books has recently been published. These books cover the entire aviation course as given at the Aviation Annex. In addition to this, the students publish a monthly newspaper which contains aeronautical topics and other school news, of interest to students.

Rotary Club Contest

THE Rotary Club of Jersey City recently held a contest in that city. All those who placed in the events as winners, are members of the Dickinson High School. The meet was extremely successful except for the intrusion of trees and buildings which hid the models from sight as they were driven by a prevailing wind.

Winners of the commercial event, were:
John Romanowski—1 min., 3 4/5 sec.
Frank Ehling—1 min., 3 sec.
George Cochrane—1 min.

Open Stick event:
John Romanowski—2 min., 36 2/5 sec.
Frank Celauro—2 min., 26 sec.
Philip Meehan—1 min., 39 sec.

The time of flight was cut down to a very small amount by the fact that the models flew out of sight very quickly. Frank Ehling lost his twin pusher on a trial non-official flight. It disappeared from sight after being timed for five minutes. The machine was never found.

NOTICES

The National Contest held on June 27-28 stimulated some of our model builders to ambitious undertakings. Art Snyder of Burbank, Calif., hitch-hiked to the National Meet, stopping off in Peru, Indiana to get his models in shape. The models were expressed from this point while he continued his journey by the shoe leather express.

The Crested Harpy Model Aero Club wishes to increase its membership. Those who would like to join or obtain further information, write to John Chaky Jr., 63 East 177th Street, Bronx, New York.

CORRESPONDENTS

Norman Zipkin of 704 F Street N.E., Washington, D.C., would like to establish a correspondence with other young men in various parts of the world. He would like to "swap" aviation information.

The Aerodynamic Design Of The Model Plane

(*Continued from page* 37)

Theoretical authorities have denied that this is the case but regardless of theory, *practice* shows it to be true. As an example I refer to the Grant Twin Tractor as proof. (A description of this model was published in the May issue of this magazine.) This plane was one of the first planes to be designed with the predetermined purpose of using this system to retain longitudinal stability. It will climb at 45°, stall, and "squash" down into perfectly normal flight. It has demonstrated this quality in the presence of many expert model fliers.

Another advantage is that the machine designed in this manner will have greater flight qualities as it carries no tail load. Thus, the wings do not have to carry so much load when the plane is in flight. On the other hand, by placing wheels at the forward part of the model which are equivalent in weight to the tail load, remarkable stability will be obtained. This is the secret of the "Twin Tractor" performance and of only Gordon Light's Wakefield model: (See May issue.) The only departure in Mr. Light's stabilizer from the system described, is that it is cambered positively while the "Twin Tractor" has a flat tail surface.

Before we discuss cambered stabilizers, it will be advantageous for you to know that the formulas for correct stabilizer area can be used for either case (A) or (B). The stabilizer area is calculated in the same manner in both instances.

Cambered Stabilizers

INSTEAD of flat surfaces, cambered or curved stabilizer surfaces may be used to advantage on a model. Whether it is designed according to system (A) or (B) makes no difference. The cambered stabilizer is merely set negative or positive as required to satisfy the dictates of either system: However, a cambered surface has a *positive* lift at a *negative* angle. In fact the angle of zero lift of an average cambered airfoil when it is cambered upward with concave surface downward is about three or four degrees. This means that the chard (a straight line through the leading and trailing edges in all cases considered here) is at a negative angle of three or four degrees to the line of thrust, when no lift is to be exerted by the airfoil. Here we will consider (—3°) to be the angle of no lift. This is an average value.

Therefore, in order to simulate the condition of a flat tail surface at 2° angle of incidence, less than the wing, it is required that the cambered surface be set at $(-2°-3°) = -5°$ angle of incidence less than the wing.

In other words, when you wish to replace a flat stabilizer with a cambered one, set the cambered stabilizer at an agle which is (3°) more negative.

Sometimes a stabilizer is used which is cambered downwards, the concave side of the airfoil facing upwards, see Fig. No. 73. In such cases, the angle of incidence of the surface relative to the wing should be (3°) more *positive* than the setting of a flat stabilizer: For instance if a flat stabilizer is set at $-2°$ to the wing and it is to be replaced with a "negative cambered" stabilizer, then the latter form of surface should be set at $(-2°+3°) = +1°$, to the wing. Usually the wing and negative cambered stabilizer are set at the same angle.

The reason for the use of the cambered surface is that it is more effective than a flat horizontal tail surface. Thus, in order to obtain the same amount of stabilizing effect as a flat surface, 20% less area may be used. This applies whether the surface is cambered downward or upward. In other words, a cambered stabilizer need

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The Aerodynamic Design Of The Model Plane

(*Continued from page* 47)

be only 80% or 4/5 as large as a flat surface.

Now in order to calculate the required stabilizer by means of the formula, it is necessary to change it slightly.

The formula for the correct area of a *positive* cambered stabilizer for a monoplane is:

$$A_s = \frac{A}{3M}\left(\frac{3C}{2} + N\right)$$

$$\text{times} \left[1 - \left(\frac{Q + \frac{2X}{M} - 5}{5}\right)\right]$$

$$\text{times} \left(1 + \frac{G + 2T}{4C}\right)(0{:}8).$$

The formula for a *negative* cambered stabilizer is the same except the quantity in the second set of radical signs, which should be changed to:

$$\left[1 - \left(\frac{Q + \frac{2X}{M} + 1}{5}\right)\right]$$

For biplanes or triplanes with cambered stabilizers, modify these formulas in the same way that the formula for a flat stabilizer is changed, when the model is a biplane or triplane.

It probably wil be necessary to stir up the "old gray matter" above your ears a little in order to thoroughly understand how to calculate stabilizer area for the various cases that will arise. However, a little determination and patience mixed in with these directions will give you excellent results. Those of you who lack these qualities may follow the general rules given for stabilizer area, in previous articles, reducing the area recommended by 20% for cambered horizontal tail planes.

In our next installment typical arrangements of factors effecting longitudinal stability will be given, as well as a summary of the important points relative to "stability."

Until then, keep that old engine turning over.

Airplane Maneuver Contest

(*Continued from page* 28)

usual but rather the usual way for most planes to fall after being stalled in flight.

To the observer on the ground, the plane which is spun, appears to hesitate slightly in full flight and then to tip, either to the right or left as the case may be, and then fall while rotating about its own nose. While falling thus, the nose is seen to be lower than the tail and the wings are banked up as they would be for an ordinary flying turn, in the direction of the spin.

The spin may be from three to a dozen or more turns in duration. No two planes spin exactly alike. That is about all that an observer from the ground can see.

The pilot of the plane finds out many other things, however. To make his plane spin, he stalls the ship until the controls feel "soft". Then for a right spin, he gives full right rudder and full back stick, see A in diagram. This tips the plane over into its "normal spin" which can be prolonged by just holding the stick and continuing the use of full right rudder. Merely neutralizing all the controls will bring many types of plane out of a spin, but the control positions shown in B, stop a right spin best; that is, left rudder and the stick in the FAR left corner.

It might be well to mention here that in a spin, the elevators are most effective, the rudder next most useful and the ailerons the least effective, of the controls. When the plane stops spinning, it will be found to be diving and must be brought to level flight by just neutralizing the controls.

As the diagram shows, there is an imaginary axis in a tail spin about which the entire plane rotates as it falls. The path followed by the nose of the fuselage is a *mall* downward spiral about this axis, while the path followed by the tail is a larger helix.

In the "flat spin," the axis of the spin is through a point near the nose of the plane, as shown, and the path of the tail is a helix. As some planes become "uncontrollable" in a "flat spin," it is considered dangerous.

Most planes will not "go flat" unless held in a prolonged "normal spin" too long. Just before "going flat," the control stick and rudder exhibit reverse forces, that is, they "take charge" and have to be pulled from the spinning position in A. The stick usually "wobbles" noticeably and the propeller vibrates as if it were out of balance. The plane begins to spin so *fast* that centrifugal force makes it difficult for the pilot to work his controls. To stop the "flat spin," the pilot must set his controls in the regular recovery position, "B," and use his engine in blasts. Sometimes if this doesn't work, rocking the ailerons in time with the engine blasts will do the trick. If the plane seems to be going to keep on "flat spinning" in spite of the pilot's efforts, he had better jump with his 'chute. The man shown in the picture on the cover is being thrown clear of the plane.

MOST good planes will not "flat spin." This tendency can be corrected usually by increasing the fin area or by moving the center of gravity forward and enlarging the horizontal stabilizer by 50% of its area.

The pilot can make some planes stop spinning after a turn and a half if he is quick at the controls. Other planes will not stop before the fifth or sixth. It depends on the plane—and the pilot.

The tail spin has a few uses such as its use for losing altitude in aerial combat, (besides making the plan an unhittable target as long as the spin lasts) and it can be used for a vertical descent, though a tight spiral is about as good for that and safer. Stunt flyers like it for "air shows" and after spinning a ship long enough to learn its characteristics, learn to make spins end thrillingly close to the ground.

Tail spinning should not be done under 3,000 feet. A pilot should never make a practice of "spinning" though it is wise that he know how to execute this maneuver and—GET OUT OF IT.